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BY THE COMPTROLLER GENERAL

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Report To The Congress

OF THE UNITED STATES

ORIGINAL

Federal Agencies Still Need To Develop Greater Computer Audit Capabilities

As the Federal Government becomes increasingly dependent on computers it is even more important for auditors to ensure that

--computer system controls are designed and operating properly; and

--computer equipment, programs, personnel, and other resources are used efficiently, effectively, and economically.

Past GAO reports recommended that audit organizations do more computer auditing. In addition, the Comptroller General of the United States has issued audit standards which outline government auditors' responsibilities to audit computer-based systems.

Some audit organizations have conducted effective computer audits. However, many Federal audit organizations have neither recognized their computer audit responsibilities nor developed the skills to meet them. This report recommends actions every Federal agency should take to define, develop, and maintain appropriate computer audit capabilities.

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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON D.C. 20548

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To the President of the Senate and the
Speaker of the House of Representatives

Computers manage increasing amounts of the Federal Government's money, property, and information resources and represent significant expenditures in capital and operating costs. Effective internal auditing can help assure management that computer-related controls are adequate to prevent errors, fraud, waste, and abuse, and that computers are used in the most effective, efficient, and economical way.

This report discusses the progress by Federal inspector general and internal audit organizations in meeting their computer audit responsibilities. It recommends actions for internal audit organizations to identify their agencies' computer audit needs and to develop the necessary audit skills to meet these needs.

We are sending copies of the report to the Director of the Office of Management and Budget and the heads of all Federal departments and agencies.

Milton J. Socolar

Acting Comptroller General
of the United States

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESS

FEDERAL AGENCIES STILL NEED TO DEVELOP GREATER COMPUTER AUDIT CAPABILITIES

D I G E S T

With continual technological advances, the use of the computer in business and government has grown. While this has increased productivity levels and satisfied information and program needs, it has not been without a heavy price. The capital and operating costs of computers are significant expenditures. In addition, computers provide access to an ever-increasing amount of an organization's money, property, and other assets; and to information resources, including personal, proprietary, or other sensitive data.

This growing reliance on computers, coupled with increasing cost, requires that Federal managers assure themselves that computers support management goals and objectives, operate efficiently and economically, and encompass adequate controls to prevent errors, fraud, waste, and abuse. Internal auditing is an important management tool to help provide such assurance.

In 1977, GAO reported that at some Federal agencies internal auditing of automatic data processing systems and controls had been inadequate. GAO recommended that all Federal internal audit groups determine the extent to which their agencies' computer activities need auditing and develop or acquire staff with the necessary skills to provide adequate computer audit coverage.

Following up on the 1977 report, GAO found that while some action has been taken, much still needs to be done. Many Federal inspector general and internal audit organizations still do not provide adequate audit coverage to their agencies' computer operations.

GAO conducted this review to evaluate the progress of Federal internal audit organizations in responding to increasing needs and requirements for effective computer auditing. By identifying agencies' problems and shortfalls in developing

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Tear Sheet.

computer audit capabilities, GAO provides guidance for agencies in establishing proper computer audit coverage and thereby helps prevent computer-related fraud, waste, and abuse.

MANY HAVE NOT RESPONDED TO COMPUTER AUDIT NEEDS

Some of the 19 Federal audit organizations GAO reviewed cannot be sure they have adequately identified their agencies' computer audit needs as recommended in the 1977 report. GAO found nine organizations that had limited, outdated, or no inventories of their agencies' computer systems to aid in planning audit coverage. (See pp. 7 and 8.)

GAO also found that many organizations have not developed and maintained the skilled staff necessary to meet computer audit responsibilities for their agencies. In particular, six organizations had little or no computer audit capabilities at the time of the review, and others acknowledged that computer audit staff and audit time were not adequate for their needs.

Although GAO found examples of effective computer auditing, insufficient computer audit capabilities generally resulted in only limited compliance with the standards issued by the Comptroller General of the United States for auditing computer-based systems. Twelve of the nineteen organizations visited did not have the computer audit capabilities to comply with the standards at the time of the review. The remaining seven organizations had conducted or scheduled computer audits to meet some objectives of the standards. (See pp. 8 to 10.)

GAO observed the following examples of effective computer audits:

--The General Services Administration suspended development of a computer system when an audit by its Inspector General showed that the proposed system would not meet a major system objective of controlling use, misuse, and abuse of interagency motor pool credit purchases. (See p. 12.)

--The Department of the Army significantly reduced the number of computer terminals planned for a $100 million project because the Army

Audit Agency reported that the projected work for computer terminals was overstated. (See p. 12.)

--The Postal Inspection Service recommended uniform manual and computer processing controls for the U.S. Postal Service's redesigned payroll system because of control weaknesses which had resulted in about $1.75 million in overpayments nationwide. (See p. 12.)

Some organizations were hindered in acquiring computer audit staff because of personnel ceiling limitations, Federal hiring restrictions, or even lack of management support for computer auditing. GAO also found that many organizations did not have formal training programs to help develop computer audit skills for existing staff. (See pp. 14 to 16.)

EVALUATION OF COMPUTER-RELATED CONTROLS IS RECEIVING GREATER EMPHASIS

The need for proper computer-related controls has increased. Continuing reports of computer fraud and abuse showing losses of millions of dollars and estimates of hundreds of millions more in losses from undetected computer crime point to weak computer-related control. In addition, Federal legislation and proposed statutes have called for prevention of fraud, waste, and abuse in private companies and Federal agencies by requiring that managers establish and maintain adequate systems of internal control. These systems necessarily include computer-related controls. As a further indication, public accounting firms have increased their consideration of computer-related controls in audit work.

Despite this emphasis, GAO found little overall direction--other than the GAO audit standards--requiring Federal internal audit organizations to specifically evaluate computer-related controls. Such evaluations can help minimize error, fraud, waste, and abuse, but are also necessary if government auditors are to fulfill their professional audit responsibilities. GAO believes the need for Federal agencies to develop their computer audit capabilities is even greater today than it was at the time of the 1977 report.

RECOMMENDATIONS

To help ensure appropriate computer audit coverage, GAO recommends that the head of each Federal agency require inspector general and internal audit organizations to:

--Identify the agency's computer audit universe, including existing computer systems and major applications as well as those being planned for design and development.

--Determine the extent to which computer activities need auditing and conduct needed audits based on requirements of the GAO computer audit standards relating to the adequacy of general and application controls. Computers should also be considered in fulfilling audit responsibilities to review for efficient, effective, and economical operations.

--Determine the staff and skills needed to meet computer audit responsibilities, and consider alternatives for developing and sustaining these capabilities.

--Periodically review audit coverage of computer systems and adjust allocations of staff resources accordingly.

--Establish a basic level of computer knowledge which all audit staff must attain. Auditors may reach this basic level either through their own educational programs or by training during their employment.

In addition, GAO recommends that the Office of Management and Budget play a more active role in monitoring agencies' progress in developing and maintaining their computer audit capabilities and provide guidance as appropriate, addressing internal audit evaluation of computer-related controls.

AGENCY COMMENTS

Eighteen of the nineteen agencies reviewed provided comments to the report and generally agreed with recommendations. Several included information on specific actions taken to help provide adequate audit coverage for their agencies' computer operations. The Office of Management and Budget also commented and agreed on the importance of proper attention to computer auditing. (See pp. 23 and 24.)

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ABBREVIATIONS

AAA	Army Audit Agency
ADP	automatic data processing

AFAA	Air Force Audit Agency
AICPA	American Institute of Certified Public Accountants
EDP	electronic data processing
GAO	General Accounting Office
GSA	General Services Administration
NAS	Naval Audit Service
OMB	Office of Management and Budget

CHAPTER 1

INTRODUCTION

Growing information needs and continued improvements in computer performance-price ratios have spread computer technology throughout business and government. Although the computer can satisfy many information demands and increase productivity, it can also be a source of error, fraud, waste, and abuse. This increases auditors' responsibilities to help assure management that

--computer systems and their controls are designed and operating properly so as to safeguard assets; minimize opportunities for misuse; and provide accurate, timely, and reliable information; and

--computer resources are used efficiently, effectively, and economically.

Computers represent not only significant investments and expenditures; they also control access to much of an organization's assets and information resources. In the Federal Government, total costs for computer resources currently exceed $15 billion annually. According to inventories reported by the General Services Administration (GSA), the number of computers used by the Federal Government has grown from 11,124 at the end of fiscal 1977 to 14,333 at the end of fiscal 1979, and is expected to expand to over 18,000 through fiscal 1981. These computers control vast amounts of assets and information resources. For example, in fiscal 1979, the computer-based system for the Social Security Administration's Retirement and Survivors Insurance and Disability Insurance programs paid benefits of $87.6 billion to 30.1 million retirement and survivors insurance beneficiaries and $13.4 billion in benefits to 4.8 million disability insurance recipients. The magnitude and growth of Federal resources represented and controlled by the computer should compel Government agencies to increase computer auditing.

This report shows the status of computer auditing in Federal internal audit organizations, alerts such organizations to the increasing need and requirements for computer auditing, and provides guidance on establishing the capabilities necessary for proper audit coverage of agencies' computer operations.

HOW HAS THE COMPUTER AFFECTED AUDITORS' RESPONSIBILITIES?

Use of the computer to automate an organization's data processing has added another dimension to auditors' responsibilities. Traditional audit approaches for evaluating the controls over manual data processing systems may no longer be appropriate for auditing automatic data processing (ADP) systems. In addition, auditors must also consider the impact of the computer in reviewing the overall efficiency, effectiveness, and economy of agency operations.

Computers require a specialized look at the system of internal control to ensure accurate, reliable data and adequate safeguards for moneys, property, and other assets. A computer-based data processing system consists of the computer hardware and programs it uses, as well as the organizations and procedures--some of them manual--for preparing data input to the computer and for using its data output. For years, some auditors succeeded in auditing around processing controls contained in computer hardware and programs by comparing input material with computer output and manually verifying computations. However, (1) the increasing number of computer uses, (2) the volume and complexity of computer computations, and (3) the trend toward online transaction systems with frequent elimination of traditional paper input, all demand that auditors now be able to audit the computer itself.

Computers also affect auditors' responsibilities to review for efficient, effective, and economical operations. Auditors should consider in their work such factors as (1) proper computer system design, (2) propriety of decisions to lease or purchase computers, and (3) user satisfaction with computer-generated data.

For government audits, the Comptroller General of the United States has issued specific standards for auditing computer-based systems. (See p. 3.) In addition, GAO has published audit guides to help the auditor evaluate the controls of computer-based systems. The guides include "Audit Guide for Reliability Assessment of Controls in Computerized Systems (Financial Statement Audits)," May 1978, "Assessing Reliability of Computer Output," June 1981, and "Evaluating Internal Controls in Computer-Based Systems," June 1981.

Other professional audit authorities have also provided standards and guidance stressing auditors' computer audit responsibilities. The American Institute of Certified Public Accountants (AICPA) issued a statement on auditing standards which addresses the effect of the computer on the independent accountant's evaluation of internal accounting controls. Other auditor guidance includes the "Systems Auditability & Control Study" prepared for the Institute of Internal Auditors, Inc. and "Control Objectives 1980" and "Certified Information Systems Auditors Study Guide, January 1981" by the EDP (electronic data processing) Auditors Foundation for Education and Research.

GAO REPORTS RECOMMEND COMPUTER AUDIT INVOLVEMENT

Several GAO reports have expressed our concern for adequate computer audit coverage throughout Government. Two such reports recommended greater computer audit involvement by internal audit groups--one to improve automated decisionmaking by computers and

the other to help prevent computer-related crime. 1/ A third report, "Computer Auditing in the Executive Departments: Not Enough Is Being Done," recommended actions Federal internal audit groups should take for a proper and effective response to computer auditing needs. 2/ This report recommended that internal audit groups study the effect of ADP on their agencies' operations to determine the extent to which computer activities need auditing. It also recommended that these groups determine the availability of computer audit staff, and develop or acquire staff with the necessary skills to provide adequate computer audit coverage.

Recent GAO reports indicate areas where computer audit work can contribute to more effective, efficient, and economical operations. For example, the report "Continued Use of Costly, Outmoded Computers in Federal Agencies Can Be Avoided" showed that certain agencies have not recognized the costs and problems of continuing to use outmoded computers. 3/ This report noted that annual savings of $1.4 million are attainable at four Federal computer facilities by replacing older equipment, and that hundreds of Federal computer facilities have similar old equipment. This report suggests that auditors have a role to play in verifying the possibility of such savings.

GAO PROVIDES AUDIT STANDARDS AND GUIDANCE FOR FEDERAL COMPUTER AUDITS

Audit standards issued by the Comptroller General of the United States provide guidance for computer auditing by government auditors. Specified computer audit standards define the degree and type of computer auditing necessary to help ensure that computer-based systems are properly controlled. Federal auditors, in particular, must consider the objectives of these standards in fulfilling their professional audit responsibilities.

We recognized a need for specific computer audit standards through a 1977 workshop on computer security sponsored jointly by the National Bureau of Standards and GAO. As a result of this workshop report, 4/ the Comptroller General in 1979 issued additional standards for auditing computer-based systems. These standards

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1/"Improvements Needed In Managing Automated Decisionmaking By Computer Throughout the Federal Government" (FGMSD-76-5, Apr. 23, 1976) and "Computer-Related Crimes In Federal Programs" (FGMSD-76-27, Apr. 27, 1976), respectively.

2/FGMSD-77-82, Sept. 28, 1977.

3/AFMD-81-9, Dec. 15, 1980.

4/"Audit and Evaluation of Computer Security" (NBS Special Publication 500-19, Oct. 1977.)

became effective January 1, 1980, and supplement our basic document "Standards For Audit of Governmental Organizations, Programs, Activities and Functions."

In early 1981, we incorporated and issued these supplemental standards in our revised basic document. The standards state that the auditor shall:

1. Review general controls in data processing systems to determine that (a) controls have been designed according to management direction and legal requirements, and (b) such controls are operating effectively to provide reliability of, and security over, the data being processed.

2. Review application controls of installed data processing applications upon which the auditor is relying to assess their reliability in processing data in a timely, accurate, and complete manner.

In general, the standards call for the auditor to evaluate the general controls of computer-based systems and the controls of computer applications (data, computer program(s), and associated manual activities designed to perform a specific job such as payroll computation, inventory control, or accounting). General controls normally pertain to all data processing done at an installation and include controls such as separation of employee duties; transaction authorization and approval procedures; security of computer hardware, computer programs, data files, and personnel; provisions for continued processing of critical applications during an emergency; and so forth. Application controls are those that may vary among applications, such as processing controls to check for unreasonable data items or data that exceeds certain preestablished limits for the applications involved.

We and other audit authorities, such as the Institute of Internal Auditors and the EDP Auditors Foundation for Education and Research, believe that the audit function should include auditor participation in reviewing the design, development, and significant modification of data processing systems and applications. 1/ This participation helps ensure that the systems or applications contain adequate controls and appropriate audit trails, that is, the means to identify and trace transactions. However, we recognize that such participation is not always possible because of the high level of computer knowledge required or limited computer audit staff. For this reason, we have included this matter in our revised standards as a goal or objective for future audit activities. A more

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1/A 1980 International Business Machines publication for improving control of information systems, "Staying In Charge," notes that "Auditors should, of course, influence the design of any control system and procedures for managing the flow of information."

detailed discussion of this objective and the computer audit standards is presented in appendix V.

Federal audit organizations' compliance with the objectives of the GAO audit standards can help provide assurance to agency management that computer systems and their controls properly safeguard assets and provide accurate, timely, and reliable information. In addition, the Office of Management and Budget (OMB) prescribes the GAO government audit standards as the basic criteria for audit coverage and operations by executive departments and agencies. The Inspector General Act of 1978 (5 U.S.C. app.) also requires compliance with these standards by the inspector general organizations the act created. In chapter 2, we discuss the extent of Federal audit organization compliance with the computer audit standards.

OBJECTIVE, SCOPE, AND METHODOLOGY

The objective of this review was to study the progress of executive departments and agencies in developing and strengthening their computer audit capabilities. The review is a followup to recommendations in our earlier reports as mentioned above, and also addresses the extent of agency compliance with the GAO standards for auditing computer-based systems.

We reviewed the computer audit activities of 19 Federal inspector general and internal audit organizations (see app. I) for the period October 1, 1977, to June 30, 1980. These include the 12 internal audit groups reviewed in our 1977 report plus 7 additional audit organizations selected for this review. The departments and agencies represented by these organizations (excluding the U.S. Postal Service) accounted for over 90 percent of the Federal computer inventory as of September 30, 1980. (See app. II.)

Other Federal audit organizations and the public accounting sector also provided information for this review. We wrote to an additional 33 Federal audit organizations, essentially all those remaining in GAO's "Directory of Federal Audit and Inspector General Organizations." Sixteen of these organizations responded and provided narrative information on their progress in computer auditing. (See app. III.) We also visited three large certified public accounting firms to learn their approaches to and achievements in computer auditing. These firms were Arthur Andersen & Co., Coopers & Lybrand, and Ernst & Whinney.

As our definition of computer auditing in this review, we used the auditor's responsibilities to review computer-related controls as prescribed by the GAO standards for auditing computer-based systems. (See app. V.) This definition focuses on auditing the computer itself as opposed to using the computer solely as an audit tool in selecting samples or analyzing data in computer information bases.

For this review we selected primarily those organizations whose departments or agencies represent significant portions of the Federal computer inventory. However, some agencies were included to help provide a cross-section of Government activities and programs that receive internal audit coverage. For example, we selected both the Comptroller of the Currency and the Federal Home Loan Bank Board to represent the Government's financial institution regulatory activities.

To determine the extent of computer auditing by the 19 audit organizations, we reviewed their planning documents, audit plans, computer audit reports, audit guidance, training records, and other related documents. We also interviewed senior managers of these organizations, including inspectors general, to ascertain their management philosophies and approaches to providing computer audit coverage for their respective agencies. To aid in obtaining comparative information, these managers also completed a GAO-developed questionnaire on their organizations' computer audit responsibilities and activities. We analyzed the information obtained and present in this report what we judge to be an accurate portrayal of the status of computer auditing in the executive departments and agencies.

CHAPTER 2

MANY FEDERAL AUDIT ORGANIZATIONS HAVE NOT MET COMPUTER AUDIT RESPONSIBILITIES

Our review of 19 Federal inspector general and internal audit organizations showed that since our 1977 report, many of these organizations have not met audit responsibilities for their agencies' computer operations. For example, nine of the organizations we visited had limited, outdated, or no inventories of their agencies' computer systems to aid in planning audit coverage. In addition, 16 of the 19 organizations acknowledged that their computer audit staffs and audit time were not adequate to meet computer audit responsibilities for their agencies.

As a result of these inadequacies, we found only limited compliance with our standards for auditing computer-based systems. Our review did indicate signs of progress, including actions to implement the GAO computer audit standards and examples of effective computer audit work; however, only 7 of the 19 organizations visited had conducted or scheduled computer audits meeting the objectives of the standards.

In some cases lack of management support for computer auditing had restricted development of computer audit staff and skills. Personnel ceilings and Federal hiring restrictions also had hindered organizations in their attempts to acquire skilled staff. In addition, we observed that many organizations did not have formal training programs to help develop and maintain the computer audit skills of existing staff.

SOME HAVE NOT CONSIDERED TOTAL AGENCY COMPUTER OPERATIONS IN PROVIDING AUDIT COVERAGE

Most organizations we reviewed are including some computer audit work in their audit plans by considering such factors as cost of computer equipment, operating cost of a computer system, number of system locations, known or expected problems, or vulnerability of a system to fraud, waste, or abuse. However, some did not consider all agency computer operations in planning and selecting their audits. For example, five organizations had not developed or otherwise obtained inventories of agency computer systems to use in planning audit coverage, and four others had limited or outdated inventories. Without knowledge of their agency's total computer operations, these audit organizations cannot be sure that they provide appropriate and effective audit coverage.

A good plan for internal audit should include identifying all agency programs and operations subject to audit--the audit universe. Our 1977 report recommended that agency internal audit groups determine the extent of computer auditing necessary for their agencies.

Identifying the computer audit universe is an essential first step in making this determination.

The computer audit universe may be represented by inventories of existing agency computer systems, but inventories alone may not indicate all areas of computer operations that organizations must consider. Information on areas such as systems being designed and developed or planned equipment acquisitions should also be obtained. This may require closer coordination with the agency's data processing element. For example, at the General Services Administration the Office of Inspector General is to be routinely notified of all planned GSA system design and development projects for possible audit participation. Several other audit organizations had no such arrangements, which increased the difficulty of identifying computer audit areas for their agencies.

Federal departments and agencies receive general direction from the Office of Management and Budget to guide audit organizations in providing adequate internal audit coverage. 1/ While not specifically addressing computer auditing, this guidance requires an audit organization to identify the audit universe for its agency. It also provides general factors or priorities to consider in selecting candidates for audit from the audit universe. Candidates are also indicated by additional OMB guidance, such as requirements for Federal agencies to audit or evaluate the security safeguards for sensitive computer systems, that is, systems that process personal, proprietary, or other sensitive data or those with a high potential for financial loss. 2/

AGENCY COMPLIANCE WITH GAO COMPUTER AUDIT STANDARDS IS LIMITED

Some audit organizations we reviewed were in partial compliance with the GAO computer audit standards in that they have conducted or scheduled some computer audits that address general and application controls. Some have also conducted or scheduled audits of developmental systems or applications. However, of 19 organizations visited, 16 acknowledged that computer audit time and staff were not adequate for their computer audit responsibilities, particularly those concerning review of system design and development. Moreover, of these 16 organizations, 6 (including the Office of Inspector General for the newly created Department of Education) have lost or have yet to develop the computer audit capability of their staff. These six organizations have plans to upgrade their capabilities, but at the time of our review their compliance with any of the standards was extremely limited and in some cases nonexistent.

1/OMB Circular No. A-73 (Revised), Mar. 15, 1978.

2/OMB Circular No. A-71, Transmittal Memorandum No. 1, July 27, 1978.

On a more positive note, we did find that several organizations were acting to actively implement the standards in their internal audit operations. We also found several excellent examples of effective computer auditing.

Agencies lack computer audit capabilities for full compliance

Our review disclosed that only about 7 of 19 audit organizations reviewed had past audit reports, current audits, and scheduled future audits addressing the basic objectives of the GAO computer audit standards. For example, one of these seven, the Office of Inspector General for the Department of Agriculture, reviews computer

--general controls in periodic audits of the Department's four computer centers and in other program audits, particularly ADP security;

--application controls usually as segments of non-ADP audits; and

--design and development activities through its "systems monitoring" audit work, which attempts to review all computer-related controls of a developmental system.

However, many of these seven still do not have the computer audit capability they need. The remaining 12 have even less computer audit capability; 6 have essentially none.

Five of the seven agencies in partial compliance with the audit standards admit they have less computer audit capabilities than they need. For example, the Air Force Audit Agency (AFAA) has scheduled and performed computer audits which address the objectives of both computer audit standards and the design and development audit goal. From October 1, 1977, to June 30, 1980, AFAA began 42 separate computer audits, completed 28 of these, and spent a total of 5,781 staff days on this work. Also, as of June 30, 1980, the AFAA had about 777 professional staff, 116 of whom were considered to be computer audit "generalists"--that is, auditors and managers with some advanced or specialized computer training. Despite this obvious computer audit activity, AFAA officials feel that computer audit time and number of available computer auditors are less than needed for the Air Force's some 1,600 most significant computer systems. AFAA officials specifically note less than adequate capabilities in the areas of computer application controls, computer security, and system design and development.

During our review, we noted six audit organizations that did not even approach compliance with the computer audit standards. In some cases, computer audit staff had been lost and not replaced. In other cases, initial computer audit staffs were just being developed.

As late as November 1979, one of these organizations had seven computer specialists, but only two remained at the time of our review. Before the loss in personnel, this organization's computer audit work basically conformed with the computer audit standards. However, with a staff of only two the group could not perform most of its scheduled computer audits for fiscal 1980. This organization's future compliance with the GAO computer audit standards may depend entirely on the success of its ongoing recruiting efforts to restaff the computer audit group. Although the other five organizations had very limited or no computer audit capabilities, by the end of our review each was recruiting or training staff to regain or establish this capability.

The most common weakness in the 19 organizations we talked to was a lack of capability to review the design and development of new computer systems and applications. These organizations generally lacked the level of technical knowledge needed to do these audits properly. However, participating in reviews of system design and development should remain an auditing goal.

Some audit organizations have acted to implement the GAO computer audit standards

During our review, we noted that several audit organizations had acted to define or to organize their computer audit operations specifically around the requirements and objectives of the GAO computer audit standards. These actions include participating in the computer system design and development process and using the standards to structure computer audit policy and audit guidelines and programs.

Some of these positive actions to implement the standards are described below. They may provide useful guidance for other organizations wanting to establish or direct their own computer audit activities.

Army auditors increase involvement during design and development stage

The Army Audit Agency (AAA) used objectives of the GAO computer audit standards to justify increased involvement in computer system design and development. This reversed an earlier AAA decision to decrease such involvement.

In 1972, AAA officials limited auditor participation in the design and development of data processing systems, setting the policy that the AAA would no longer monitor selected developmental systems from inception through Army approval as operational. Instead the AAA would essentially participate only in testing of selected developmental systems just prior to the systems becoming operational. However, given our position on auditor participation in reviewing computer systems and applications during their design and development, AAA reversed this policy. It will now

perform selected reviews of systems during design and development to determine the adequacy of internal controls being designed into the system, and to determine management effectiveness for the system development effort.

In addition, an AAA official has conducted classes for members of the Army Computer Systems Command involved in the system design and development process. These classes provide the auditor's perspective on the purpose of and need for designing internal controls and audit trails into data processing systems.

Audit organizations use GAO standards to organize computer audit guidance

Several organizations have incorporated the GAO computer audit standards into their audit guidance material. This guidance includes audit guidelines and audit programs structured around the standards.

The Air Force Audit Agency is working on a three-volume set of audit guidelines to parallel the two computer audit standards and the goal for auditor participation during design and development. During our review, AFAA had completed one volume and was continuing work on the remaining two. The completed volume, "Guidelines for Audits of Operational Computer Based Systems," corresponds to the GAO standard for review of application controls. These new audit guidelines give background on each audit area, technical skills needed to perform an audit, audit objectives and guidelines, and suggested audit steps.

The AFAA guidelines expand on the "Guidelines for Audits of Automatic Data Processing" developed by a Department of Defense study panel for the Office of the Assistant Secretary of Defense (Comptroller). The Defense guidelines were still in draft at the end of our review. Their purpose is to improve computer audit coverage Department-wide by establishing a unified approach and consistent basis for computer auditing. They also define the auditor's role and establish criteria for education and experience in computer auditing. They include an appendix which categorizes each identified audit area by the GAO computer audit standard(s) or audit goal it addresses.

As another example, the Naval Audit Service (NAS) uses three standardized audit programs for its computer audits. According to NAS officials, each program generally corresponds to one of the GAO computer audit standards and the system design and development goal. These audit programs contain detailed audit steps which the auditor tailors to the needs of the particular audit.

Some agencies perform effective computer audits

During our review, we noted several examples of effective computer auditing which resulted in savings and program improvements. Three such examples are provided below.

General Services Administration

In early 1979, auditors with GSA's Office of Inspector General began participating in a GSA computer system development project called the "Credit Card Accounting and Reporting System." The auditors' participation was to ensure that those developing the system adequately considered its documentation, auditability, and internal controls. A major objective was to control the use, misuse, and abuse of the U.S. Government National Credit Card (Standard Form 149), used for interagency motor pool purchases.

During their preliminary review, GSA auditors found the system could meet some of its objectives, but not a major one: to control fraudulent use and abuse of valid credit cards. This weakness was due primarily to GSA's inability to successfully negotiate for necessary oil company data on Government purchases. Such information was necessary to develop the data base for many planned reports. From their preliminary review, the auditors concluded that other alternatives should be explored before further development of the credit card system. As a result, system development was suspended and it remained in that status through the end of our review. This suspension means that GSA will not incur additional costs for a computer system that does not meet management's objectives. A GSA auditor indicated that estimates of costs avoided could include a remaining $150,000 for personnel in the development process and an estimated $193,000 in annual operating costs.

Army Audit Agency

The review of the Army's Project Vertical Installation Automation Baseline is an example of the results of Army Audit Agency computer auditing. AAA made this review in part to determine the reasonableness of computer workload requirements for the project, a 10-year effort to upgrade the data processing capability at 46 Army installations. The estimated cost for this project exceeds $100 million. In its February 1980 report, AAA concluded that the project's workload requirements were overstated, which could lead to acquiring too much computer support for the installations. At four installations reviewed, AAA auditors found workload projections overstated by 17 to 36 percent, for a total of 238 terminals. Based on this finding, the Army substantially cut the number of computer terminals required for the 46 installations.

Postal Inspection Service

In 1979, the Postal Inspection Service made a nationwide review of the U.S. Postal Service's redesigned payroll system. The objectives included determining whether this system properly executes and controls payroll adjustments, and controls collections of payroll advances and accounts receivable. During this review, postal inspectors also used many computer programs to select, summarize, and analyze payroll data.

One review finding showed the system processing and paying many duplicate and incorrect adjustments, and some incorrect payments occurring with certain holiday work conditions. Postal Inspectors attributed these weaknesses to inadequate or inoperative computer programming controls and manual controls, and to a lack of effective methods and controls for recovering overpayments. Postal inspectors estimated the nationwide overpayments resulting from these control weaknesses at about $1.75 million. The audit report recommended establishing uniform manual and automatic data processing control methods to ensure detection and correction of payroll errors.

MANAGEMENT COMMITMENT IS NEEDED TO PROVIDE COMPUTER AUDIT CAPABILITIES

Our review showed that changes in an organization's policies or commitment for computer auditing sometimes hindered the development or caused a loss of computer audit staff. As the following examples indicate, without proper management support organizations cannot develop or maintain appropriate staff and skills to provide proper computer audit coverage.

In 1972, the Air Force Audit Agency revised its planning policy to reduce the number of computer audits and to do more of other types of audit which could provide more measurable savings. As computer audits occurred less often, AFAA auditors had less time to keep specialized procedures current or to develop new techniques. The revised audit policy coupled with personnel losses and accelerated technical changes in the computer environment all contributed to a rapid decline during the late 1970s in AFAA's ability to audit complex Air Force computer systems. However, AFAA management has adopted objectives designed to reverse this trend and enhance computer audit skills. These objectives include identifying and updating the computer audit inventory, obtaining personnel with needed skills through recruiting or training, and improving the computer audit training program.

A few Federal agencies have lost much or all of their computer audit staff due to attrition and have been slow to rebuild these staffs. Management in these agencies simply lacked a commitment to computer auditing. For example, as discussed earlier in this chapter, one computer audit group lost six of the seven members on board in November 1979 and had replaced only one by August 1980. Management's indecisiveness about the role of the computer audit group within the organization contributed to this staff attrition, which caused delay or cancellation of planned audit work. In another case, a senior official of the audit organization judged computer auditing to be an insignificant area for the agency even though the agency's data processing activities had not been recently surveyed. As a result, organization officials did not replace lost computer audit staff for well over a year. Again, planned audits had to be canceled.

In some audit organizations we found that management resistance to computer technology slowed the initial development of computer auditing. This resistance is being overcome and these organizations now have hiring or training programs to develop computer auditing staffs.

STAFFING RESTRICTIONS MAY CALL FOR INCREASED COMPUTER TRAINING FOR EXISTING STAFF

Hiring people with appropriate computer audit knowledge and experience is one way for an organization to acquire a qualified computer audit staff, but this is not always possible. A few organizations have successfully done this, but others have been hindered by personnel ceilings, hiring freezes, and the like. In such cases, managers must look to existing staff to provide necessary computer audit skills.

Many audit organizations we reviewed had plans to create their staffs by hiring persons already trained in computer auditing or computer technology. Some, like the General Services Administration, have been successful. GSA's Office of Inspector General received an increased personnel ceiling and was able to devote some auditing positions exclusively to computer auditing. At the time of our review, the group had grown to include eight auditors, with the addition of four more planned--at least one of whom will be a computer specialist. However, subsequent to our review, GSA reduced the planned additional staff to two instead of four because of budget and staffing restrictions.

Some other agencies have experienced problems in acquiring computer audit staff. Our review questionnaire showed that of 15 organizations indicating that computer audit time available was less than needed, 7 attributed this to inadequate staffing due to personnel ceilings. (See app. IV.) Some of these pointed to the President's March 14, 1980, Federal hiring limitations as hindering the replacement of lost staff. 1/ Two others indicated that, regardless of personnel ceilings, they could not attract enough staff with computer audit knowledge and skill in the foreseeable future.

As hiring of trained computer audit staff becomes more difficult, audit organizations can use existing staff to perform computer audits if the necessary training is provided. An appropriate training program can supplement recruiting efforts. For example, AFAA has been unable to hire sufficient computer-trained auditors and, as an alternative, is emphasizing development of its computer audit training program to provide the necessary audit skills.

1/The Jan. 21, 1981, Federal hiring freeze further restricts recruitment by executive agencies.

FORMAL TRAINING PROGRAMS ARE NEEDED TO PROVIDE COMPUTER AUDIT SKILLS

Few organizations we reviewed had a formal training program to provide auditors and computer audit staff with the level of computer knowledge necessary for their audit work. Professional audit standards require that auditors have adequate knowledge and skills to perform their work, and with the growing dependence on ADP an understanding of computers has become essential. A formal training program can help ensure that appropriate knowledge and skills are developed and maintained.

All auditors need basic computer knowledge

No modern auditor can do without a basic awareness of computer technology. Growing use of the computer to automate accounting systems and provide management information increases the likelihood that auditors must use computer-generated reports or other information and must consider the impact of the computer on their audit work. However, during our review we found that only 6 of 19 organizations provided a basic level of computer training for all auditors.

While some aspects of computer auditing may require highly specialized skills, others which use computer-generated data may simply require an understanding of the computer and its workings. The auditor may need to know what information a computer system can provide, the risk of accepting such data as correct, and when to bring in additional technical audit assistance to determine data accuracy and reliability. In addition, computer knowledge aids the auditor in communicating with agency computer personnel.

The need for a basic level of computer knowledge in government auditing is well recognized. For example, in January 1979 the Federal Audit Executives Council endorsed a training program that shows the types of training desirable to develop and maintain a government auditor's skills. The program prescribes basic instruction on computers for all auditors who have not received such knowledge in their educational backgrounds.

Training is essential to ensure that computer audit staffs are qualified

The skills needed to sustain an audit organization's computer audit capabilities require continual training. Several organizations do provide computer training programs, but the majority of those reviewed do not provide formal audit training opportunities. Without such training, the organization cannot ensure that adequate computer audit skills will be available when needed.

Auditors, computer specialists, or both, may provide the computer audit expertise needed by an audit organization. Qualified consultants may also be used. However, when computer audit skills

come from within the audit organization, training plays an important role. Depending on their educational background, auditors may need training in internal controls of automated systems, computer programming, data retrieval, or other computer skills. On the other hand, computer specialists working for the audit group may require training in basic auditing concepts or familiarization with an agency's computer hardware or software. In addition, both auditors and computer specialists need continuing training to keep up with changing computer technology or changes to agency computer systems and hardware.

Some agencies or audit organizations have put together their own programs and are now providing external training at other agency or Government training facilities, colleges and universities, through seminars, and through correspondence courses such as those offered by the U.S. Army Institute for Professional Development. For example, the Office of Inspector General for the Department of Health and Human Services has a National Professional Development Center. Although we did not evaluate course content or quality the Center's curriculum includes nine courses on auditing computer systems plus other courses on data retrieval techniques.

The Interagency Auditor Training Programs of the Graduate School, U.S. Department of Agriculture, are one external source of computer training for government auditors. In conjunction with the Office of Personnel Management, the Interagency Auditor Training Programs offer specialized computer and computer audit training for general and computer auditors. From October 1, 1979, to June 30, 1980, they provided computer training to 97 Federal auditors from various agencies. Other institutions also offer training to improve auditors' computer knowledge. These include:

--American Institute of Certified Public Accountants, New York, N.Y.

--Canadian Institute of Chartered Accountants, Toronto.

--Department of Defense Computer Institute, Washington, D.C.

--EDP Auditors Foundation, Carol Stream, Ill.

--Institute of Internal Auditors, Altamonte Springs, Fla.

Our review noted that although auditors at many audit organizations had received some training, only 7 of 19 organizations have formal training programs to develop new computer auditors or to maintain the audit knowledge and skill of existing staff. If provided at all, training at the other 12 organizations was, in our opinion, haphazard and often self-initiated by the individual staff members.

As discussed earlier in this chapter, qualified computer audit staff cannot always be readily recruited and an established computer audit training program can give an organization greater flexibility in using existing staff to provide computer audit capabilities.

CHAPTER 3

GROWING CONCERN FOR PROPER COMPUTER-RELATED CONTROLS REQUIRES GREATER EMPHASIS BY FEDERAL INTERNAL AUDIT ORGANIZATIONS

Concern for proper computer-related controls and their evaluation has grown since our 1977 report. Audit standards and guidance by the Comptroller General and other professional audit authorities increasingly emphasize these controls. The need is demonstrated by continuing incidents of computer-related crime, and is recognized in Federal legislation calling for proper internal control systems in business and government. Concern is also evidenced by increased computer auditing by public accounting firms. But despite this increased awareness, our review showed that Federal agencies generally do not place high priority on the evaluation of computer-related controls by internal audit groups. This lack of emphasis may have contributed to the general lack of adequate computer audit capability that we observed.

CONTINUING COMPUTER CRIME DEMANDS PROPER COMPUTER-RELATED CONTROLS

Abuse of the computer to intentionally cause loss or to achieve personal gain is a continuing problem. Although these crimes frequently cause losses of millions of dollars, crime experts believe most computer crime goes unreported or undetected. Auditors can help minimize the risk of such crime by helping to ensure that adequate computer-related controls are in place.

Computer-related crimes cause concern because they often involve millions of dollars and those that are reported may represent only the tip of the iceberg. Some experts believe that, for fear of adverse publicity, only a fraction of detected computer crimes are reported. We concur in this view. Of reported crimes, one of the largest due to a single computer-related crime is the $185 million loss in the 1973 Equity Funding Corporation of America scandal. In other reported computer-related crimes, losses of over $1 million are not unusual.

Computer crime is also difficult to detect in that victims are often unaware that the crime has been committed. For example, the Equity Funding scandal took place over a period of years before discovery. In another case, the Security Pacific Bank of Los Angeles, California, was the victim of a $10.2 million computer-related theft in 1978. About a week after the theft took place, the bank was still unaware the loss had occurred. Only after the Federal Bureau of Investigation contacted the bank about a related investigation was the loss discovered. Considering both unreported and undetected crime, some experts estimate that the annual national loss due to computer crime could range in the hundreds of millions of dollars.

One of our prior reports, "Computer-Related Crimes in Federal Programs," noted 69 computer-related crimes or other incidents in Federal programs which resulted in a total loss of over $2 million. 1/ In addition to monetary loss, some of these crimes violated the privacy of individuals whose data records were involved. Our report further noted that most cases examined were not sophisticated attempts to use computer technology for fraudulent purposes. Instead, they involved uncomplicated acts made easier by inadequate internal controls for the systems.

The vulnerability of the computer requires that an assessment of the internal controls be an essential part of an audit. In this assessment, the auditor must be alert to situations or transactions that may be indications of fraud, improper or illegal spending or operations, or other waste or inefficiency. Still, it should be remembered that the auditor's evaluation is not designed to give absolute assurance that no such situations exist. The audit process is not a substitute for adequate internal control.

CONGRESS SUPPORTS ADEQUATE INTERNAL CONTROL SYSTEMS

Congress strongly supports adequate systems of internal control as a means of preventing error, fraud, waste, and abuse. Congressional concern has led to existing legislation as well as proposed legislation that requires business and Government managers to devise and maintain adequate internal control systems. Increasingly, these internal control systems include computer-related controls as business and Government become more dependent on the computer to provide information for management decisions and to manage transactions affecting financial and information resources. This, in turn, emphasizes the auditor's responsibility to consider computer-related controls as part of the evaluation of internal control systems.

The Securities and Exchange Act of 1934, as amended by the Foreign Corrupt Practices Act of 1977, is one measure that requires adequate internal control systems for private companies. This law requires that every company issuing securities registered with the Securities and Exchange Commission have a system of internal accounting controls. These controls should provide reasonable assurance that assets are safeguarded and that records accurately reflect the transactions and disposition of these assets. Although not adopted specifically for this law, the AICPA's Statement on Auditing Standards Number 20 expresses the increasing concern for adequate internal control. It requires the independent auditor to inform a company's senior managers and the board of directors or its audit committee of any weaknesses in internal accounting control. Implicit in the auditor's evaluation of internal accounting controls is the evaluation of such controls in computer-based systems.

1/FGMSD-76-27, Apr. 27, 1976.

Another effort to stress internal control procedures in the Federal Government is now before the Congress. Bills to amend the Accounting and Auditing Act of 1950 (31 U.S.C. 65) would emphasize the act's requirements for Federal agencies to establish and maintain effective internal control systems. The proposed legislation would require ongoing evaluations of internal accounting and administrative control systems, and prompt correction of detected weaknesses. As with those of the Foreign Corrupt Practices Act, such requirements highlight the importance of the auditor's evaluation of internal controls including those of computer-based systems.

PUBLIC ACCOUNTING FIRMS EMPHASIZE EVALUATION OF COMPUTER-RELATED CONTROLS

Our look at three public accounting firms found them also devoting efforts to computer auditing. Their approaches differ somewhat, but each firm is committed to computer auditing for evaluating clients' internal control systems and improving audit efficiency.

All three firms have computer audit staffs primarily to assist the accountant in financial statement audits. This assistance includes compliance testing of computer-related controls and more detailed substantive tests. In a unique approach, the Computer Audit Assistance Group of Coopers & Lybrand is a separate element of the firm and markets its services to the firm's general practice staff. The other two firms draw on computer-trained accountants or management consultants as the general practice staffs identify the need.

These three firms also develop computer programs (software) to automate their audit or computer audit activities. Such audit software can aid in testing clients' control systems and reduce the time needed to perform audit work. The director of Coopers & Lybrand's Computer Audit Assistance Group said that at the time of our visit, the group had developed some 60,000 computer programs for auditing and other services, such as tax planning and analysis and business planning.

The approaches of these major auditing firms demonstrate that evaluating computer-related controls is an integral part of audits performed in the public accounting sector. This indicates the need for similar commitments to auditing these controls in the Federal Government.

FEDERAL AUDIT POLICY DOES NOT EMPHASIZE COMPUTER-RELATED CONTROLS

Even with the growing concern for proper computer-related controls discussed in this chapter, we found little emphasis on these controls in formal or informal policy guidance for Federal internal audit operations. We feel that this lack of specific policy guidance contributed to the inadequate computer audit

coverage we observed in general. More specific policy guidance for executive departments and agencies could help ensure that internal audit organizations appropriately consider computer-related controls in planning and providing audit coverage.

While we have established standards and provided guidance for the audit community, little formal direction exists requiring Federal audit organizations to perform computer audits. For example, OMB Circular No. A-73 (Revised) sets forth policies for audit of Federal operations and programs. Although this document prescribes the Comptroller General's government audit standards as the basic criteria for audit coverage and operations, it does not specifically address auditing computer-related controls. In addition, Transmittal Memorandum No. 1 to OMB Circular No. A-71 requires the audit and evaluation of sensitive computer systems but does not specifically assign this responsibility to the internal audit function. As a result, not all audit organizations we reviewed considered the requirements of this transmittal memorandum in scheduling computer audits, and in some agencies audit and evaluation of sensitive computer systems were performed by the data processing function. In our opinion, this lack of specific OMB guidance may contribute to unclear audit responsibilities and more dependence on management attitudes for computer audit involvement.

As discussed in chapter 2, management support can directly affect the extent of an organization's computer audit activities. For example, the establishment of separate computer audit groups within the Inspector General offices at the General Services Administration and the Department of the Interior can be directly attributed to support for computer auditing by senior managers of these offices. On the other hand, lack of such support in two other organizations resulted in delays in replacing lost computer audit staff and cancellation of planned audits.

Audit organizations have also received little in the way of informal direction. In our 1977 report we recommended that OMB monitor the progress of Federal internal audit groups in computer auditing. Our review at the 19 audit organizations and contact with OMB officials confirmed that this generally has not been done. Such monitoring could provide some direction to audit groups on establishing and maintaining computer audit capabilities and perhaps indicate a need for more specific guidance on evaluating computer-related controls.

CHAPTER 4

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

With the expanding computer usage and the billions being spent annually on data processing, Federal inspector general and internal audit organizations must properly consider Government computer operations in fulfilling their internal audit responsibilities. These organizations must plan adequate computer audit coverage and provide the staff to do this work.

The computer has added a new dimension to the role of government auditors. Agencies' internal control systems include controls for preparing input to the computer and for using its output, and controls contained in computer hardware and programs. The auditor must consider these controls in providing assurance to management that information provided is accurate and reliable and that financial assets and information are protected against loss. Auditors must also review for efficient, effective, and economical use of resources which include computer equipment, programs, and other spending for computer operations.

We have discussed computer audit responsibilities for Federal internal auditors in several Government-wide reports and in government audit standards. Our 1977 report recommended that each Federal internal group respond to the challenge of computer auditing essentially by determining the agency's computer audit needs and developing the audit staff to meet these needs. Moreover, the Comptroller General's standards for auditing computer-based systems describe auditors' responsibilities to review for adequate controls in computer systems and applications. These standards also prescribe a goal of auditor participation in reviewing systems and applications during design and development.

Our review showed that many Federal internal audit organizations have not provided adequate audit coverage for their agencies' computer operations as prescribed by our 1977 report and the GAO computer audit standards. While most of the 19 audit organizations reviewed had conducted at least some computer audits since our 1977 report, many had not completely identified their agencies' computer activities to aid in planning appropriate audit coverage. For some organizations, computer systems and applications in design and development were important omissions in identifying potential audit needs. As a result, these organizations cannot affirm that they provide adequate computer audit coverage or that they use computer audit staff effectively and efficiently.

In addition, many audit organizations have not developed or maintained appropriately skilled audit staff to meet computer audit needs. Because of the lack of computer audit capabilities, many organizations were not in compliance with the GAO computer

audit standards. In some cases we found examples of effective computer audit work and concerted efforts to implement the standards, but without more computer audit staff and audit time, many organizations will not meet their audit responsibilities as prescribed by the standards. This is particularly true for six organizations which had little or no computer audit capabilities at the time of our review.

In developing computer audit staff, many organizations were hindered by such things as lack of management support, personnel ceilings, and hiring restrictions. But we also found that many organizations appear to have relied on hiring qualified staff and neglected development of computer audit capabilities by training existing staff. An ongoing program to train existing staff can supplement hiring and provide a continuing source of computer audit staff to help offset the effect of hiring restrictions. This training should provide all auditors with a basic level of computer knowledge needed for today's computer environment, as well as develop and maintain the skills of computer audit staff.

Other than GAO standards, Federal internal audit organizations overall have received little direction specifically addressing requirements for auditing computer-related controls. We believe that this lack of specific direction makes computer audit involvement more dependent on attitudes and commitments of individual managers, and may have contributed to the inadequate computer auditing we observed in our review.

RECOMMENDATIONS

We recommend that the heads of Federal agencies help ensure that their inspector general and internal audit organizations properly consider agency computer operations in providing internal audit coverage by requiring them to:

--Identify the agency's computer audit universe, including existing computer systems and major applications as well as those being planned for design and development.

--Determine the extent to which computer activities need auditing and conduct needed audits based on requirements of the GAO computer audit standards relating to the adequacy of general and application controls. Computers should also be considered in fulfilling audit responsibilities to review for efficient, effective, and economical operations.

--Determine the staff and skills needed to meet computer audit responsibilities, and consider alternatives for developing and sustaining these capabilities.

--Periodically review audit coverage of computer systems and adjust allocations of staff resources accordingly.

--Establish a basic level of computer knowledge which all audit staff must attain. Auditors may reach this basic level through their own educational programs or by training during their employment.

In addition, we recommend that the Office of Management and Budget play a more active role in monitoring agencies' progress in developing and maintaining their computer audit capabilities, and provide guidance as appropriate, addressing internal audit evaluation of computer-related controls.

AGENCY COMMENTS

Eighteen agencies and the Office of Management and Budget commented on our report and generally agreed with the recommendations. Fifteen of these agencies responded in writing and their comments are included in appendix VI. Most supported the need for increased emphasis of computer auditing in the Federal Government and some provided information on current and planned actions to increase their computer audit capabilities. For example, the Office of Inspector General for the Department of Transportation did a staff study (see p. 59 for management synopsis) to determine its staffing requirements for auditing ADP systems. Based on the study, the Department has begun to recruit ADP auditors. Others indicated that staffing restrictions and other audit responsibilities will continue to restrict their computer audit efforts. Both the Department of Health and Human Services and the National Aeronautics and Space Administration feel that because of such factors, development of greater computer audit capabilities must be viewed as a long term goal.

The Department of Commerce felt that it was difficult to establish a basic level of computer knowledge which all staff must attain. As discussed on pages 16 and 17, this level of training is prescribed in the "Governmental Auditor Training Profile" endorsed by the Federal Audit Executives Council. One suggested source of such training is the Interagency Auditor Training Programs. In addition, some agencies have developed their own basic level ADP courses. For example, the Department of Housing and Urban Development indicated that it will begin in September 1981, to provide auditors with a basic level of ADP knowledge. It will give courses on the Department's audit guides which incorporate the GAO computer audit standards. The Department of Commerce also commented that it was not practical to maintain, for audit purposes, an inventory of agency computer systems at the applications level. While it may not be necessary to have a complete inventory of every application, an inventory should exist showing at least all major applications and those critical to the agency's mission. Commerce also felt that no further OMB guidance was necessary. We believe the varied conditions observed throughout the Federal establishment argue for additional OMB involvement.

The Office of Management and Budget commented that this report, together with the June 1981 GAO audit guide, "Evaluating Internal Controls in Computer-Based Systems," will be helpful in improving Federal audit capabilities. OMB also noted that the President's Council on Integrity and Efficiency has established a training committee to identify auditor training needs including those for computer auditing. In addition, the President's Council has selected the area of computer security for a proposed project to address computer system protection, data accuracy and reliability, efficiency of operations, and user satisfaction. To help target corrective action and monitor agency progress in developing computer audit capabilities, OMB indicated that it would request us to arrange a briefing on this report for the President's Council.

OMB also commented that it had reviewed agency plans for audits of "sensitive" computer applications, and was monitoring the area and providing guidance. However, we believe the conditions we observed indicate a need for OMB to play a more active role in computer auditing.

INSPECTOR GENERAL AND INTERNAL AUDIT ORGANIZATIONS CONTACTED DURING REVIEW

Department of Agriculture--Office of Inspector General

Department of Defense--Army Audit Agency, Naval Audit Service, Air Force Audit Agency

Department of the Interior--Office of Inspector General

Department of Health and Human Services--Office of Inspector General

Department of Education--Office of Inspector General

Department of Housing and Urban Development--Office of Inspector General

Department of Labor--Office of Inspector General

Department of Transportation--Office of Inspector General

General Services Administration--Office of Inspector General

National Aeronautics and Space Administration--Office of Inspector General

Veterans Administration--Office of Inspector General

Department of the Treasury--Office of Inspector General, Comptroller of the Currency (Inspections and Audit Division)

Department of Energy--Office of Inspector General

Department of Commerce--Office of Inspector General

Federal Home Loan Bank Board--Internal Evaluation and Compliance Office

U.S. Postal Service--Postal Inspection Service

NUMBER OF COMPUTER SYSTEMS AND RELATED CENTRAL PROCESSING UNITS FOR AGENCIES CONTACTED DURING THIS REVIEW AT SEPTEMBER 30, 1980

Agency	Computer system (note a)	Central processing units
Department of Agriculture	124	146
Department of Defense:		
Army	1,379	1,647
Air Force	1,812	2,418
Navy	1,660	2,054
Department of Interior	240	263
Department of Education	2	2
Department of Health and Human Services	285	451
Department of Housing and Urban Development	3	3
Department of Labor	33	38
Department of Transportation	263	372
General Services Administration	41	43
National Aeronautics and Space Administration	482	1,903
Veterans Administration	411	420
Department of the Treasury	177	218
Department of Energy	2,915	3,716
Department of Commerce	411	443
Federal Home Loan Bank Board	2	2
Totals for agencies contacted	10,240	14,139
Total inventory for U.S. Government (note b)	11,055	15,142
Percentage of total U.S. Government inventory represented by agencies contacted	93	93

a/For purposes of this inventory, a central processing unit is synonymous with a computer, while a computer system may include one or more central processing units.

b/Does not include computer resources of the U.S. Postal Service.

GAO note: Agencies may have computer audit responsibilities which are not indicated by the schedule amounts. Some agencies, for example, may have audit responsibility for contractors' computer systems or, as in the Department of Defense, for computer systems which are embedded in a weapons system or used for certain classified purposes, neither of which category is included in the inventory numbers.

SOURCE: General Services Administration's fiscal 1980 "Automatic Data Processing Equipment Inventory."

ADDITIONAL INSPECTOR GENERAL AND INTERNAL AUDIT ORGANIZATIONS PROVIDING INFORMATION FOR THIS REVIEW

Agency for International Development--Auditor General

Civil Aeronautics Board--Bureau of Carrier Accounts and Audits

Department of Defense--Defense Audit Service, Defense Contract Audit Agency, U.S. Marine Corps Field Audit Service

Department of Health and Human Services, Office of Child Support Enforcement--Audit Division

Department of Justice--Internal Audit Staff

Equal Employment Opportunity Commission--Office of Audits

Federal Communications Commission--Internal Review and Security Division

Federal Emergency Management Agency--Office of Inspector General

Government Printing Office--Office of Audits

National Endowment for the Humanities--Audit Office

Nuclear Regulatory Commission--Office of Inspector and Auditor

Pension Benefit Guaranty Corporation--Internal Audit

Small Business Administration--Office of Inspector General

Tennessee Valley Authority--Auditing Branch

U.S. International Communication Agency--Office of Audits

RESPONSES OF AUDIT ORGANIZATIONS

TO SELECTED ITEMS OF REVIEW QUESTIONNAIRE 1/

1. Percentage of organizations' total internal audit time spent performing computer audit work for the periods October 1, 1977 to June 30, 1980 and prior to October 1977:

Percent spent	Number of organizations	
	Oct. 1, 1977 to June 30, 1980	Prior to Oct. 1977 (note a)
Less than 10	15	16
11 to 20	3	1
21 to 30	-	-
31 to 40	-	-
41 to 50	-	-
over 50	-	-

a/One agency had no information on work prior to Oct. 1977.

2. Approximate number of professional audit staff and number of these considered computer audit specialists or generalists as of June 30, 1980:

Department/agency	Professional audit staff	Computer Audit Specialists or Generalists (note a)	
		Number	Percent of professional staff
Agriculture	350	30	8.6
Army Audit Agency	649	12	1.8
Naval Audit Service	419	22	5.3
Air Force Audit Agency	777	116	14.9
Energy	40	1	2.5
Interior	126	10	7.9
Health and Human Services	680	50	7.4
Housing and Urban Development	300	5	1.7
Labor	166	2	1.2
Transportation	339	2	0.6
General Services Administration	236	13	5.5
National Aeronautics and Space Administration	52	5	9.6

1/These responses do not include information from the Department of Energy and the Department of Education which were just organizing initial computer audit capabilities as of June 30, 1980. However, they do include those of the Defense Audit Service which completed a questionnaire for our review.

Veterans Administration	240	39	16.3
Treasury (note b)	10	0	-
Comptroller of the Currency	6	0	-
Commerce	85	4	4.7
Federal Home Loan Bank Board	9	0	-
Postal Inspection Service	475	36	7.6
Defense Audit Service	649	12	1.8

a/We requested that agencies identify the members of their audit staff who are generally qualified for and dedicated to computer audit work. Based on our discussions with the personnel of these agencies on their replies to this question, perceptions of what constitutes a computer-qualified auditor varied considerably, and these statistics do not include all staff with some level of computer audit knowledge or skills. The numbers should not be interpreted as implying either adequate or inadequate computer audit staff for agencies' audit responsibilities; that point was covered elsewhere in our questionnaire (See p. 4).

b/These figures represent only our review of the immediate Office of the Inspector General. Considering the Treasury Department's decentralized audit system for its bureaus and the Comptroller of the Currency (shown above), audit staff totaled 633 Department-wide with 33 (5.2 percent) computer audit specialists.

3. Is there a specific base level of computer classroom/seminar training that is routinely provided to all members of your organization's audit staff?

   7 Yes

   11 No

4. Adequacy of the number of computer audit specialists in the organization:

   0 More than adequate

   3 Adequate

   15 Less than adequate

5. Does your organization have a separate identifiable computer audit group?

   9 Yes

   9 No

6. Has your organization ever taken an inventory of computer systems?

   12 Yes

   6 No

7. Are computer audit areas set forth explicitly in planning documents, or are they implicitly included under other areas such as procurement, payroll, supply, and so forth?

   11 Computer audit areas are set forth explicitly in the planning documents.

   3 Computer audit areas are implicitly included in planning documents.

   4 ADP audit areas are both explicitly and implicitly included in planning documents.

8. Does your organization use any standardized audit programs, checklists, or questionnaires in performing computer audit work? By standardized, we mean a uniform program, checklist or questionnaire that is used in audits of all (or many) computer systems.

   6 Yes

   12 No

9. Is the amount of staff time that you expect your organization to devote to computer audit work more than, about equal to, or less than the amount that needs to be spend on computer auditing?

   0 Expected audit time is more than needed.

   3 Expected audit time is about what is needed.

   15 Expected audit time is less than needed.

10. If indicated above that expected computer audit time is less than needed, what is the principal reason why your organization does not do more computer audit work?

   7 Personnel ceilings preclude hiring sufficient additional staff.

   2 Regardless of personnel ceilings, sufficient numbers of computer trained staff could not be hired in the foreseeable future.

   4 Other audit work priorities are too great to permit sufficient additional computer audit work.

1 Available training funds are insufficient to permit staff computer skill upgrading within a reasonable period.

0 Audit workload is too great to permit sufficient staff time for upgrading computer skill within a reasonable period.

2 Other.

NOTE: Totals 16 rather than 15 (as indicated by question 9) because two categories were reported by one agency.

11. Will computer auditing within your organization over the next 5 years increase, decrease, or remain about the same?

10 Significantly increase.

8 Moderately increase.

0 Remain about the same.

0 Moderately decrease.

0 Significantly decrease.

SUMMARY OF ADDITIONAL GAO AUDIT STANDARDS FOR AUDITING COMPUTER-BASED SYSTEMS

In March 1979, the Comptroller General of the United States issued additional government audit standards for providing proper audit coverage to computer-based systems. Effective January 1, 1980, these standards supplement GAO's basic document, "Standards for Audit of Governmental Organizations, Programs, Activities, and Functions." Issued initially as a separate document entitled "Auditing Computer-Based Systems," the supplemental standards have been incorporated into the 1981 revision of the basic document.

The Comptroller General's audit standards must be followed by Federal auditors for audits of Federal organizations, programs, activities, functions, and funds received by contractors, nonprofit organizations, and other external organizations. They are recommended for audits of State and local government organizations, programs, activities, and functions performed by State or local government auditors or by public accountants. Below we present a discussion of the computer audit responsibilities prescribed for such government auditing.

STANDARD FOR AUDIT REVIEW OF GENERAL CONTROLS IN COMPUTER-BASED SYSTEMS

The first standard is:

> The auditor shall review general controls in data processing systems to determine that (A) controls have been designed according to management direction and legal requirements, and (B) such controls are operating effectively to provide reliability of, and security over, the data being processed.

The transition from mechanical data processing to automatic data processing means traditional audit approaches must be revised. The complexity and far-reaching scope of such systems requires that the auditor give greater attention both to the system that processes the data and to the data itself. The theory is that if the system is secure and controlled, the auditor will be able to rely on the data processed and reported.

The auditor should distinguish between general and application controls. General controls are normally applicable to most processing being carried out within the installation, while application controls may vary and are therefore reviewed on an individual application basis. (See standard 2 for application controls audit review.) Auditors are to review and evaluate these general controls and consider their effectiveness in performing the review of individual application controls.

Organizational controls

Authority and responsibility must be delegated in such a manner that the organizational objectives can be met with efficiency and effectiveness. The auditor should review the organization, delegation of authority, responsibilities, and separation of duties in the organization. Such reviews are to determine whether functional lines of authority are designed to meet the organization's objectives and whether the separation of duties provides for a relatively strong level of internal control. For example, separation of duties should provide for separation among program and systems development functions, computer operations, control over input data, and the control group responsible for maintaining application controls. The total system must be considered by the auditor.

In reviewing the separation of duties, the auditor should evaluate the control strengths and report on weaknesses resulting from inadequate separation. Policies of periodic rotation of employees and mandatory vacation scheduling may help management maintain adequate separation of duties. The auditor should ascertain whether such policies are being followed.

Physical facilities, personnel, and security controls

Adequate physical facilities and other resources (such as adequately trained personnel and supplies) are necessary for the organization to meet its data processing objectives. The auditor should review these factors to determine whether or not the organization has adequate resources for meeting its needs.

Personnel management--including supervision, motivation, and professional development of personnel--is integral to successful management of the data processing function. The auditor should review and evaluate these management policies and practices to ascertain whether the necessary policies exist and are being followed. For example, since the entire field of computers is rapidly evolving, the organization's personnel management office needs to develop--in conjunction with the data processing organization--an education and training program. This program should keep employees abreast of current developments so that they may perform their duties most efficiently and economically, and use new methods whenever they are demonstrably cost effective. Inadequate personnel training and development programs in data processing can hinder accomplishment of the organization's mission.

Adequacy of provisions for security of computer hardware, computer programs, data files, data transmission, input and output material, and personnel should also be reviewed by the auditor. This review should include not only the central processing facility but also extend to computer terminals, communications operations, and other peripheral equipment.

In reviewing physical security of computer hardware, the auditor should consider the adequacy of contingency plans for continued processing of critical applications in the event of a disruption of normal data processing functions. This should include provisions for emergency power and hardware backup as well as detailed plans for making use of the backup equipment and transporting personnel, programs, forms, and data files to the alternate processing location. The auditor should also consider the extent to which this contingency plan has been tested to determine the probability of continuing data processsing support in the event of a real emergency.

In reviewing physical security of data files, the auditor should ensure that data and program file libraries are maintained by personnel who do not have access to computers and computer programs, file libraries are secure, computer operators and other personnel do not have unlimited access to the library, and provisions have been made for backup of files (including offsite backup). When files are normally maintained online, the auditor should consider whether they are protected by adequate access authorization controls and whether backup copies of files are regularly maintained. The auditor should verify that backup files are properly identified, labeled, and the contents checked to ensure that the backup medium is complete and accurate. Similar stringent controls should exist for program backup files.

Operating systems controls

Computer systems are frequently controlled by operating systems (usually referred to as systems software). Since these operating systems provide data handling and multiprogramming capabilities, file label checking, and many other authorization controls, the operating system is integral to the general controls over computer processing. The auditor should be aware of the controls the operating system can exercise and should ascertain the extent to which those controls have been implemented, as well as how they may be bypassed or overridden. The auditor also should be aware of the fact that personnel responsible for maintaining the operating system, and other persons with the ability to modify the operating system, may intentionally or accidentally cause specific control features within the operating system to become ineffective.

Hardware controls

Computer hardware frequently has the capability to detect erroneous conditions related to hardware malfunctions (as contrasted to program malfunctions). The auditor should be aware of (1) how the installation relies on these hardware controls, (2) how the operating system utilizes these controls, and (3) how the detected hardware errors are reported within the installation as well as the procedures for taking corrective action.

STANDARD FOR REVIEW OF APPLICATION CONTROLS IN COMPUTER-BASED SYSTEMS

The second standard is:

> The auditor shall review application controls of installed data processing applications upon which the auditor is relying to assess their reliability in processing data in a timely, accurate, and complete manner.

Before an assessment of processing reliability or integrity in any application can be complete, both the specific application controls and the general controls must be evaluated in their entirety.

The audit work performed in responding to standard 2 has two basic objectives. Both are discussed below.

Conformance with standards and approved design

The first objective is to determine whether the installed applications/systems conform to applicable standards and the latest approved design specifications.

Audit compliance with supplemental standard 2 provides assurance that the approved specifications, with all built-in internal controls (input, processing, output, etc.,) have been installed as intended, are properly documented, and have been adequately tested.

When the auditor tests data reliability, such tests should include examining supporting documentation for selected transactions, testing the clerical accuracy of the manner in which transactions have been entered and summarized, and testing compliance with control procedures. In addition, auditors may wish to test selected data files to identify possible exception conditions and the accuracy of data conversion or capture. If the data records are maintained in machine-readable condition the auditor should, where appropriate, make use of computer-assisted audit techniques in testing data records.

Tests for control weaknesses

The second objective is to test internal controls and the reliability of the data produced. In addition to showing adequacy of controls, such tests may disclose possible weaknesses in the installed applications/systems.

These periodic audits should probe the installed application for weaknesses, changed circumstances which affect risk exposure, etc., with the intention of stimulating corrective modifications and improving the installed applications. Also, the auditor must be mindful, when conducting periodic tests, that there are no

guarantees that the application system will continue to operate in accordance with the latest approved specifications. Therefore, adequacy of controls over program changes and operating procedures are most important.

Finally, the auditor must be alert to the possibility of fraud or other irregularities in computer systems. Although looking for fraud is usually not the primary objective of audits, the detection of fraud should be a general audit objective.

GOAL FOR AUDITOR PARTICIPATION DURING SYSTEM DESIGN AND DEVELOPMENT

We believe, as do other professional audit authorities, that the normal audit function should include active auditor participation in reviewing the design and development of, or significant modifications to, data processing systems (software as well as hardware) or applications. However, such auditor participation may not be feasible during the short run due to the level of computer knowledge required or to limited staff resources. We therefore include this requirement as an audit goal. In the absence of effective audit of the system design and development processes, the resultant system

--may not possess the built-in controls necessary to ensure proper and efficient operations;

--may not provide the capability to track events through the system and thus impede--if not completely frustrate--audit review of the system in operation; and,

--(for financial systems) may not comply with generally accepted accounting principles and may result in qualifications of the accountant's opinion on the financial statements.

In addition, internal auditors may require specific managerial authorization or direction to perform this work and external auditors may need a special engagement. Whenever management approval to perform such work has not already been given, the auditor has a duty to alert management of the potential results of such restriction. The auditor should formally communicate to management information on the possible adverse effects of not requiring audit review and evaluation of automated systems design and development processes.

Underlying rationale

Both auditors and management officials have an interest in ensuring that system design, development, and overall operations achieve the objectives of adequate internal controls and effective

auditability. 1/ For systems already in existence when audits are made, the auditor should determine whether the objectives of the systems are being achieved.

As capabilities of computer-based information systems have grown, the systems and applications have grown more complex and interrelated. Initially, there were separate automated applications for personnel, payroll, and labor cost accounting. Each application or system would be processed independently of the others and input material would be generated from separate and distinct sources, then processed against separate data files.

With the integration of application systems now being encountered, the payroll, personnel, and labor-cost accounting applications can be interrelated subsystems of a far larger online system, and the outputs of one subsystem can now be the inputs for another without any human review. Thus, a control weakness in one segment of the system may have completely unanticipated effects in other segments with a cascading of effects causing catastrophic results. Such mistakes, waste, and general confusion may even adversely affect the organization's viability.

The objectives of requiring auditor participation in system design, development, and modification are set forth below, with comments on each.

Management policies

Objective 1: To provide reasonable assurance that systems/applications carry out the policies management has prescribed for them.

Policies setting forth what is expected of ADP systems should be established by management, and the auditor should determine whether these policies are being carried out in the design. The auditor should ascertain that an appropriate approval process is being followed, both in the development of new systems and in the modification of existing systems. The auditor should consider the need for approval of the system's design by data processing management, user groups, and other groups whose data and reports may be affected. Also, the auditor should review the provisions for security that are required by management to protect data for programs against unauthorized access and modification.

1/Because the engagement of public accountants has unique conditions, it is unlikely that public accountants will be able to comply fully with this objective. However, they may partially comply by determining the extent and effectiveness of the work of the company's internal auditors or outside accountants in the design and development phases.

If management's requirements are not being met, the auditor has the responsibility to report shortcomings to the appropriate officials who can take corrective action. Efforts to bring new systems/applications to operation by scheduled dates frequently have resulted in some management-desired elements or controls being set aside by system designers for later consideration. The auditor, in retaining his independence during the system design and development cycle, should report such actions to top management for appropriate resolution.

Audit trails

Objective 2: To provide reasonable assurance that systems/applications provide the controls and audit trails needed for management, auditor, and operational review.

In financial applications, it is considered a basic tenet that the capability must exist to trace a transaction from its initiation, through all the intermediate processing steps, to the resulting financial statements. Similarly, information in the financial statements must be traceable to its origination. Such capability is referred to by a variety of terms--audit trail, management trail, transaction trail, etc.--and is also highly essential in nonfinancial systems/applications. The reliability of the output can be properly assessed when the transaction processing flow can be traced and the controls over it (both manual and automated) can be evaluated.

Audit review of the system design and development process can help assure management that this tracing capability is in fact being engineered into the systems/applications.

Controls

Objective 3: To provide reasonable assurance to management that systems/applications include the controls necessary to protect against loss or serious error.

The system design and development processes include (1) definition of the processing to be carried out by a computer, (2) design of the processing steps to be followed, (3) determination of the data input and files that will be required, and (4) specification of each individual program's input data and output. Each of these areas must be properly controlled in consonance with good management practices, and the auditor's review must assure management that the system/application, once placed in operation, will meet this objective.

(It is possible for properly designed systems, with excellent control mechanisms built in, to have these controls bypassed or overridden. This area is addressed under computer audit standards 1 and 2.)

Note that almost every system has manual aspects (e.g., input origination, output disposition) and these should be covered for adequacy by the auditor reviewing systems controls.

Efficiency and economy

Objective 4: To provide reasonable assurance that systems/applications will be efficient and economical in operation.

Determining whether an organization is managing and utilizing its resources (such as personnel, property, and space) efficiently and economically and reporting on the causes of inefficiencies or uneconomical practices, including inadequacies in management information systems, administrative procedures, or organizational structures, is considered here as a basic characteristic of government program audits. With the development of complex systems/applications, the internal auditor's review should also demonstrate that operations will produce desired results at minimum cost. For example, early in the system's development stage, the auditor should review the adequacy of the (1) statement of mission needs and system objectives, (2) feasibility study and evaluation of alternative designs to meet those needs and objectives, and (3) cost-benefit analysis which attributes specific benefits and costs to system alternatives.

Legal requirements

Objective 5: To provide reasonable assurance that systems/applications conform with applicable legal requirements.

Legal requirements applicable to systems/applications may originate from a variety of sources. One such requirement is compliance with privacy statutes enacted at State and Federal levels, in which certain types of information about individuals are restricted as to collection and use. Appropriate safeguards are obviously necessary in such systems. Conversely, those organizations subject to the Freedom of Information Act should have systems/applications designed so that appropriate and timely response can be made to legitimate requests under the statute. The applicability of the Federal Information Processing Standards program to the system involved should also be checked by the auditor. If such standards apply, they should be included in the auditor's review.

Once again, auditor review of the design and development processes can help assure management that these requirements have been considered and satisfied.

Documentation

Objective 6: To provide reasonable assurance that systems/applications are documented in a manner that will provide the understanding of the system required for appropriate maintenance and auditing.

The auditor should determine whether the design/modification process produces documentation sufficient to define (1) the processing that must be performed by programs in the system, (2) the data files to be processed, (3) the reports to be prepared for users, (4) the operating instructions for use by computer operators, and (5) the user group instructions for preparation and control of data. The auditor should also ascertain whether management policy provides for evaluation of documentation and adequate testing of the system before it is made operational. These steps are to ensure that reliance can be placed on the system and its controls.

The methods of achieving these objectives will be determined by the circumstances attending the specific situation. Generally, such audit work will cover reviewing adequacy of management policies; examining approvals, documentation, test results, cost studies, and other data to determine whether management policies and legal requirements are being followed; and determining whether the system possesses the necessary control features and audit trails.

The auditor should not become part of the system design/development team to perform work under this objective. Auditor involvement should be limited to reviewing what is being done by the team and reporting to management an objective evaluation of the effort.

At the completion of the design and development phases and during final system testing phases, the auditor should verify that the implemented system conforms with these six objectives.

On all audits of programs, activities, and functions supported by existing computer-based systems, the auditor shall follow the general and application standards for computer-related auditing. If, during an audit, the auditor finds indications that the system goals--as set forth in this objective--are not being met or have changed, this should be reported to appropriate officials.

APPENDIX VI

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

AUG 11 1981

Mr. W. D. Campbell
General Accounting Office
Room 6001, 441 G Street, N.W.
Washington, D. C 20548

Dear Mr. Campbell:

This is in response to your request for comments on the draft report, "Continuing Need by Federal Agencies to Develop Greater Computer Audit Capabilities."

Overall, we believe this report, together with your new audit guide "Evaluating Internal Controls in Computer-Based Systems," will be helpful in improving Federal audit capabilities. The issue is an important one, and it is proper that attention be directed toward it.

We would like to offer the following observations:

-- The report cites "little overall direction" and recommends that OMB monitor computer audit capabilities and provide guidance. This appears to overlook OMB actions since GAO's 1977 report on the same subject. In 1978 OMB issued Circular No. A-71, Transmittal Memorandum No. 1, which calls for audits of "sensitive" computer applications triennially. Under this Circular, OMB has reviewed agency plans and has required changes in those that do not meet the requirements of the Circular. OMB is continuing to monitor and provide guidance.

-- The President's Council on Integrity and Efficiency is currently involved in two activities which directly relate to the needs addressed by this report. A Training Committee has been established to identify auditor training needs and to develop a program to meet these needs. One of the areas which is being addressed is that of computer auditing. Additionally, the President's Council has identified the area of computer security for a proposed project which will address protection of computer systems against significant threats, assurance that data is accurate and reliable, and assurance that system operations are efficient and satisfy user requirements.

-- The report does not always distinguish properly between management roles and auditor roles. For example, in calling on agency auditors to inventory computer systems and applications, the report does not mention that primary responsibility for such an inventory is with management. Recently, management's responsibility in this area was clearly reaffirmed in the "Paperwork Reduction Act of 1980."

We plan to contact your staff in the future to arrange for a briefing to be presented to the members of the President's Council at a later date. This would permit us to target our efforts for corrective action and do a more effective job of monitoring agency progress in developing and maintaining their computer audit capabilities.

Thank you for the opportunity to comment.

Sincerely,

Edwin L. Harper
Deputy Director

APPENDIX VI

United States Department of Agriculture

Office of Inspector General

Washington, D.C. 20250

Mr. W. D. Campbell
Acting Director
General Accounting Office

Dear Mr. Campbell:

We have reviewed the draft report entitled "Continuing Need by Federal Agencies To Develop Greater Computer Audit Capabilities," and are in general agreement with the recommendations.

We offer the following comments to the reported recommendations:

— Identify the agency's computer audit universe, including existing computer systems and applications as well as those being planned for design and development.

We agree the agency's computer audit universe should be identified and reviewed periodically in conjunction with the audit planning process. We believe, however, that the audit universe must stem from a perpetual inventory maintained by the ADP focal point within the agency. Within USDA, the development, maintenance and coordination of these inventories rests with the Office of Operations and Finance, Data Services Division. We have worked closely with Data Services to better insure the current inventory system identifies all current and proposed ADP systems.

— Determine the extent to which computer activities need auditing and conduct needed audits based on requirements of the GAO computer audit standards relating to the (1) adequacy of general and application controls; and (2) efficient, effective, and economical use of computers.

We strive to adhere to the GAO computer audit standards during all audits. To stay current on Departmental ADP activities and to improve audit services, the ADP audit function, as it relates to USDA administered operations, is centralized in one regional office. Residency audit staffs, consisting of ADP specialists and auditors, are located at all but one USDA computer center. In addition, each OIG regional office maintains ADP specialists and auditors who evaluate State and local ADP systems which handle USDA program activities. ADP systems and applications are recommended for audit by these auditors and ADP specialists. Their recommendations are evaluated and prioritized by management with major consideration given to susceptibility to fraud, abuse and economic efficiencies.

— Determine the staff and skills needed to meet computer audit responsibilities, and consider alternatives for developing and sustaining these capabilities.

OIG is continually evaluating the staffing and experience needed to carry out its audit program. Because data processing continues to grow within the Department, we have tried to adjust our audit staff to meet these needs. We have increased the number of ADP specialists in OIG from four in 1974 to nineteen in 1981. We have also intensified our training efforts in the ADP area. Approximately 65 percent of our auditors have now had some form of ADP training. In 1982 we plan to spend $1,616,000 for ADP training and to purchase minicomputers which will greatly enhance our capability to audit through the computer.

— Periodically review audit coverage of computer systems and adjust allocations of staff resources accordingly.

The OIG audit program is continually changing. Audits are added and deleted based on changing priorities. At least once every six months audit managers meet to discuss audit priorities and adjust allocations of staff resources.

— Establish a basic level of computer knowledge which all audit staff must attain. Auditors may reach this basic level through their own educational programs or by training during their employment.

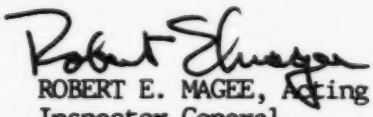
OIG has adopted the Federal Audit Executive Council's Auditor Training Profile and the Interagency Auditor Training Program's ADP Policy and Curriculum Standards Committee report as the basis for our auditor training program. We have supplemented these guidelines with internal training programs, such as:

1. Introduction to ADP - a training program for new auditors which presents the ADP auditing standards and their application in OIG.

2. Audit of ADP Systems and Applications - a training program which instructs the auditor in GAO's ADP Auditing Standards and the AICPA's SAS #3.

We appreciate the opportunity to comment on this draft report.

Sincerely,



ROBERT E. MAGEE, Acting
Inspector General

APPENDIX VI

DEPARTMENT OF HEALTH & HUMAN SERVICES

Office of Inspector General

Washington, D.C. 20201

29 JUL 1981

Mr. Gregory J. Ahart
Director, Human Resources
Division
United States General
Accounting Office
Washington, D.C. 20548

Dear Mr. Ahart:

The Secretary asked that I respond to your request for our comments on your draft report entitled, "Continuing Need By Federal Agencies To Develop Greater Computer Audit Capabilities." The enclosed comments represent the tentative position of the Department and are subject to reevaluation when the final version of this report is received.

We appreciate the opportunity to comment on this draft report before its publication.

Sincerely yours,

Richard P. Kusserow
Inspector General

Enclosure

APPENDIX VI

COMMENTS OF THE DEPARTMENT OF HEALTH AND HUMAN SERVICES ON THE GAO DRAFT REPORT, "CONTINUING NEED BY FEDERAL AGENCIES TO DEVELOP GREATER COMPUTER AUDIT CAPABILITIES"

We agree with the GAO that there is a need for increased emphasis on computer related audits. The OIG Audit Agency is committed to the continued involvement of our auditors in all areas of computer auditing and to increased audit coverage of computer-based systems.

As pointed out in the GAO audit report, the Audit Agency has taken strong and aggressive action to insure that computer related audits are adequately covered. We have developed specific guidelines in our audit policy handbook for each of the GAO computer audit standards to insure our auditors are involved in all phases of automatic data processing (ADP). We have also established an ADP Audit Committee. The members, top headquarters and field managers, evaluate and recommend ways in which the Audit Agency can meet the challenge of effective computer auditing.

Achieving the intent of the GAO recommendations must be viewed as a long range goal. As staff auditors complete the Audit Agency's computer audit training programs, we will gradually increase our capacity to conduct more ADP audits of systems under design and in operation.

GAO Recommendations

1. Identify the agency's computer audit universe, including existing computer systems and applications as well as those being planned for design and development.

We agree. As of June 1981 an inventory has been compiled of the Department's large scale computer systems identifying their location, make/model and date acquired. A complete computer listing of all the ADP applications assigned to these systems has also been generated. The Office of the Assistant Secretary for Management and Budget maintains these lists on a current basis. We are also considering having all the Operating Divisions (OPDIV's) in this Department routinely notify the Office of Inspector General of all planned major systems design and development projects for possible audit participation.

2. Determine the extent to which computer activities need auditing and conduct needed audits based on requirements of the GAO computer audit standards relating to the (1) adequacy of general and application controls; and (2) efficient, effective, and economical use of computers.

We agree. The Audit Agency has long performed limited audits of selected aspects of computer systems. The Annual Work Plan for FY 1981 includes audits of several SSA computer systems. For example, the Audit Agency recently completed a comprehensive audit into all aspects of SSA's computer processing system for annual wage reporting on magnetic tape. The auditors participated in SSA's design and development for the SSI "Offset Provisions - Project Windfall" and recently completed a follow-up review of the security controls over SSA's telecommunications system. The Audit Agency has been actively involved in a number of computer matches involving SSA programs as well as programs administered by other Departmental OPDIV's, other Federal agencies, or State and local government organizations. These matches are designed to identify people who may be receiving benefits for which they are not entitled. We are committed to continue and, to the extent possible, increase our audit coverage of the Department's 50 large scale computer systems.

3. Determine the staff and skills needed to meet computer audit responsibilities, and consider alternatives for developing and sustaining these capabilities.

The Audit Agency is well aware of the need for specialized skills needed to meet computer audit requirements. We have a staff of about 50 audit specialists -- computer systems analysts as well as auditor trained specialists in the field of computer auditing and statistical sampling -- at our headquarters and regional offices. In 1973, the headquarters staff (Advanced Audit Techniques Staff) developed a computer audit system called HEWCAS. This system comprises procedures, training, and time sharing computer programs for all auditors to utilize in conducting examinations of computer records. It is our policy to include use of HEWCAS, computer programs, test decks or other advanced audit techniques in all internal audit programs encompassing specific computer applications. The Advanced Audit Techniques Staff and our computer system analysts are constantly involved in writing application programs to assist auditors in performing computer related audits.

4. Periodically review audit coverage of computer systems and adjust allocations of staff resources accordingly.

We agree and are constantly searching for new ways to allocate our staff resources to audit SSA's expanding computer systems. When SSA initiates a new system, we adjust our staffing to the extent possible, to provide sufficient comprehensive audit coverage.

5. Establish a basic level of computer knowledge which all audit staff must attain. Auditors may reach this basic level through their own education programs or by training during their employment.

APPENDIX VI

As pointed out in the report, the Office of Inspector General established a National Professional Development Center (NPDC) in June 1978. The NPDC is charged with the responsibility of developing a comprehensive professional development program designed to expand the expertise of the professional staff and enhance the accomplishment of the Audit Agency's mission. To this end, the NPDC has included in its curriculum nine courses on auditing computer systems, plus other courses on data retrieval techniques. To keep abreast of the latest changes in the state of the art, the NPDC is constantly upgrading the training programs to better serve the needs of the Department and of the auditor. In addition to providing courses at the NPDC, we encourage the professional staff to participate and become active members of other professional organizations and to seek additional outside training.

APPENDIX VI

UNITED STATES DEPARTMENT OF EDUCATION
WASHINGTON, D.C. 20202

OFFICE OF INSPECTOR GENERAL

AUG - 7 1981

Mr. Gregory J. Ahart
Director
Human Resources Division
United States General
Accounting Office
Washington, D.C.

Dear Mr. Ahart:

The Secretary has asked that I respond to your request for our comments on your draft report entitled, "Continuing Need By Federal Agencies to Develop Greater Computer Audit Capabilities." We acknowledge the need for compliance with the GAO standards for auditing computer-based systems. These standards are part of our audit policy manual. We are also developing audit guidelines and audit programs to institutionalize these standards in our audit work.

In accordance with your recommendations, we plan to identify the Department's computer audit universe, including existing computer systems and applications, as well as those being planned for design and development. This process will include determining the extent to which computer activities need auditing. We plan to have this process completed by October 1, 1981. Once this task is completed, we will proceed to determine our needs regarding staffing and the associated skill levels required to meet our computer audit responsibilities.

The computer audit universe, along with all other elements of our audit universe, will be prioritized in accordance with OMB Circular A-73. To the extent our resources permit and in line with other audit priorities, we will conduct audits of the Department's computer systems and applications in accordance with GAO standards. We will assess, at least annually, the adequacy of audit coverage of the computer area and make appropriate adjustments in audit plans.

APPENDIX VI

We plan to augment our computer audit staff to the extent possible in our restricted hiring situation. We will provide computer audit training to our current staff to the extent possible with our limited training funds. We are developing programmed learning tools to assist auditors in developing certain computer audit skills.

It is our intention to meet the GAO standards to the best of our ability within the limits of our resources and the competing demands for those resources.

Sincerely,

James B. Thomas, Jr.
Inspector General

APPENDIX VI

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
OFFICE OF INSPECTOR GENERAL
WASHINGTON, D.C. 20410

August 7, 1981

IN REPLY REFER TO:
ZA 1601
ZA 2012.17

Mr. W. D. Campbell
Acting Director, Accounting and
Financial Management Division
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Campbell:

The Secretary has asked me to comment on the draft report "Continuing Need by Federal Agencies to Develop Greater Computer Audit Capabilities." Comments on each of the GAO recommendations follow:

Identify the agency's computer audit universe, including existing computer systems and applications as well as those being planned for design and development.

The Department of Housing and Urban Development (HUD) maintains an inventory of automated systems which is updated annually. The inventory includes a description of operational systems, systems under development and systems planned for future operations. We use this inventory to identify sources for data used in internal audits and investigations. Also, we use the inventory in selecting automated application systems for audit.

Determine the extent to which computer activities need auditing and conduct needed audits based on requirements of the GAO computer audit standards related to the: (1) adequacy of general and application controls; and (2) efficient, effective and economical use of computers.

Our selection of audits is based upon the criteria established in Office of Management and Budget Circular A-73, Audit of Federal Operations and Programs. In our preliminary planning for the Fiscal Year 1982 Annual Audit Plan, we have scheduled five major automated application systems for audit. We will assign responsibility for conducting some of these audits to our field office auditors who have data processing training or experience.

The scope of the application system audits includes an evaluation of the effectiveness of the systems in meeting the needs of programmatic users and the efficiency of these systems. In addition, we periodically schedule and conduct audits of general controls and audits which address the efficient, effective and economical use of computers. For example, we have two major audits in progress which address the latter -- an audit of data processing management and an audit of our field offices' use of data processing.

We have worked with the Department's ADP Security Officer to establish procedures for using risk analysis in developing automated systems. When effectively implemented, these procedures will enable our staff to: (1) reduce the time required to audit automated application systems, (2) expand the audit coverage, and (3) allocate audit resources to high risk application systems. In addition, the procedures will benefit data processing users, data processing personnel and computer security administrators in developing controls for automated systems.

The proposed procedures provide for auditor participation during the design and development of systems and for an evaluation of operational systems. These procedures will increase the effectiveness of our audit staff in complying with the GAO computer audit standards and enable the Department to comply with OMB Circular A-71, "Security of Federal Automated Information Systems."

Determine the staff and skills needed to meet computer audit responsibilities, and consider alternatives for developing and sustaining these capabilities.

We will continue to evaluate the staffing and skills needed to meet computer audit responsibilities and to revise our training plan as required.

In the past year, we have added two computer auditors to our Headquarters audit staff. Through an inter-agency agreement with the Federal Computer Performance Evaluation and Simulation Center, we have provided additional resources for computer auditing.

Periodically review audit coverage of computer systems and adjust allocations of staff resources accordingly.

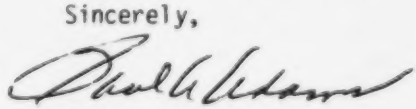
We review audit coverage of computer systems annually in the audit planning process, and allocate resources based on prescribed Office of Management and Budget criteria.

Establish a basic level of computer knowledge which all audit staff must attain. Auditors may reach the basic level either through their own educational programs or by training during their employment.

We currently are incorporating GAO computer audit standards into our audit guides. The audit guides will include a section on general and application controls. The latter will be tailored to the specific types of audits which we regularly conduct. Starting September 1981, we will conduct training courses on these guides. This approach offers the advantages of providing basic level knowledge and enabling auditors to apply this knowledge to specific types of audits. Use of the guides will be required in audits involving computer-based systems.

Thank you for the opportunity to comment on the draft report.

Sincerely,



Paul A. Adams
Deputy Inspector General

APPENDIX VI

U.S. Department of Labor

Office of Inspector General
Washington, D.C. 20210

Reply to the Attention of:

AUG 5 1981

Mr. W. D. Campbell
Room 6001
441 G Street, N. W.
Washington, D. C. 20548

Dear Mr. Campbell:

This is in reply to your letter to the Secretary of Labor requesting comments on the draft GAO report entitled "Continuing Need by Federal Agencies to Develop Greater Computer Audit Capabilities."

The Department basically concurs with the recommendations contained in this report. Attached is a summary of actions taken or being taken to correct problems identified in the GAO review.

Thank you for giving us the opportunity to comment.

Sincerely,

E. W. Stephenson
for

Thomas F. McBride
Inspector General

Attachment

APPENDIX VI

U. S. Department of Labor's Response to
the Draft General Accounting Office
Report Entitled --
"Continuing Need By Federal Agencies To
Develop Greater Computer Audit Capabilities"

Recommendation: Heads of Federal agencies help ensure that their inspector general and internal audit organizations properly consider agency computer operations in providing internal audit coverage by requiring them to:

--Identify the agency's computer audit universe, including existing computer systems and applications as well as those being planned for design and development.

--Determine the extent to which computer activities need auditing and conduct needed audits based on requirements of the GAO computer audit standards relating to the

(1) adequacy of general and application controls; and

(2) efficient, effective, and economical use of computers.

--Determine the staff and skills needed to meet computer audit responsibilities, and consider alternatives for developing and sustaining these capabilities.

--Periodically review audit coverage of computer systems and adjust allocations of staff resources accordingly.

--Establish a basic level of computer knowledge which all audit staff must attain. Auditors may reach this basic level through their own educational programs or by training during their employment.

o U. S. GOVERNMENT PRINTING OFFICE : 1981 361-043/793

Response: The Department concurs: Within the the Department there are over 100 automated systems, and over a three year period from fiscal year 1980 to 1982, the estimated budget for ADP related activities has increased from about $63 million to $92 million. The Department operates six major computers supported by 48 central processing units, and uses a variety of remote batch terminals, interactive terminals, mini-computers, and micro computer based word processing systems and telecommunications networks. These systems have become virtually inseparable from the programs they support and the Office of Inspector General must have appropriate audit and analytical skills not only to meet GAO computer audit standards but also to be able to more effectively use the computer in identifying problems relating to fraud, waste, and abuse in the Department's programs and in meeting OIG management needs.

Presently the OIG has a good estimate of the Department's ADP inventory. In the past, the OIG had a staff dedicated to performing reviews of ADP systems including application controls and design and development activities. However, this capability was greatly diminished through personnel losses, hiring restrictions and mandatory workload factors involving CETA and other external audits.

OIG recognizes that this situation must be quickly reversed and there is a high-priority need for experienced computer professionals. Skilled ADP personnel are urgently required for efficiency, effectiveness, and economy audits of application and computer systems, and for the evaluation of controls in complex applications. As personnel ceilings are lifted and hiring authority is granted, several individuals with highly skilled ADP backgrounds will be quickly recruited and hired. Also, a program is being developed to provide existing staff members with the necessary computer audit skills. The Assistant Inspector General for Audit has identified key members of the audit staff who, based on their knowledge and interest in ADP auditing, will work with the to-be-hired ADP specialists and be responsible for:

--identifying a course of study and on-the-job training to enable themselves to become especially proficient in the ADP area;

--assisting in the identification of suitable training programs in ADP auditing for all OIG professional staff; and

--becoming leaders in conducting ADP audits of all agency programs and operations deemed to be particularly vulnerable to fraud, waste, abuse, and error.

We believe the two-pronged approach of hiring ADP specialists and providing specialized training to existing staff will be effective, over time, in developing the level of expertise necessary to meet GAO computer audit standards.

APPENDIX VI

U.S. Department of Transportation
Office of the Secretary of Transportation

Assistant Secretary for Administration

400 Seventh Street, S.W.
Washington, D.C. 20590

July 22, 1981

Mr. W. D. Campbell
Acting Director, Accounting and
Financial Management Division
U.S. General Accounting Office
Washington, DC 20548

Dear Mr. Campbell:

We have reviewed the proposed draft report, "Continuing Need By Federal Agencies To Develop Greater Computer Audit Capabilities," dated June 25, 1981, and concur in the findings and recommendations to the extent they apply to this Department. It should be noted that the Department's Inspector General has initiated action to rectify conditions cited in the GAO draft report. Our actions on specific recommendations are shown below.

1. With respect to the first, second, and fourth recommendations on page iv of the report, no action has been taken. We are in the process of recruiting to establish an ADP audit capability. Action on these recommendations will be taken as soon as this capability is established.

2. On the third recommendation we have made a study to determine our staffing requirements and have started recruitment of ADP auditors. A copy of the study and three job announcements are enclosed.

3. On the fifth recommendation we have identified the training needed to establish a basic level of computer knowledge which all audit staff members must attain. Enclosed is a copy of our auditor training profile showing the training identified.

Sincerely,

Robert L. Fairman

Enclosures

APPENDIX VI

U.S. Department of Transportation
Office of the Secretary of Transportation

Memorandum

Date: FEB 3 1981 Reply to Attn. of: JP-30

Subject: Staff Study on Auditing Automated Data Processing Systems by the OIG

From: Paul C. Hoshall
Chief, ADP Support Group

To: Renald P. Morani
Assistant Inspector General for
Policy, Planning and Resources

Attached is a staff study which I believe presents a realistic overview of the problems facing the Office of Inspector General in reviewing Automated Data Processing (ADP) Systems throughout the Department of Transportation. We have tried to provide recommendations which will address the identified problems and will provide a basis for a comprehensive and effective ADP review program within the OIG.

As soon as decisions are made regarding the four areas of recommendations set out in the management synopsis on page 3 of the study, I recommend that a small task force be assigned the job of implementation. Specific task force members would be selected with an eye toward coordinating progress on all adopted recommendations and for rapid alternatives analysis to implement this critical area as soon as possible.

Attachment

-#-

APPENDIX VI

DEPARTMENT OF TRANSPORTATION

OFFICE OF INSPECTOR GENERAL

AUDITING AUTOMATED DATA PROCESSING SYSTEMS

(MANAGEMENT SYNOPSIS)

AS OF JANUARY 30, 1981

APPENDIX VI

THE CURRENT SITUATION

The Department of Transportation (DOT), Office of Inspector General (OIG) is not currently organized, staffed or trained to effectively carry out all existing responsibilities with respect to reviews of planned, developing or functioning Automated Data Processing (ADP) systems. There is no clear definition of:

1. The types and/or levels of reviews necessary;

2. The specific type and/or location of the major ADP systems with which the OIG must contend;

3. Specific organizational components responsible for various aspects of necessary reviews;

4. Specific procedures to be followed in accomplishing assigned duties; and

5. The training and/or experience necessary to accomplish identified workload.

RECOMMENDATIONS

This staff study recommends:

1. Identifying and staffing two core ADP review groups:

   a. An ADP Audit staff reporting directly to the Director, Office of DOT-Wide Programs and responsible for conducting or leading ADP audits throughout DOT; and

   b. An ADP technical support staff reporting directly to the Assistant Inspector General for Policy, Plans, and Resources Management, and responsible for furnishing ADP technical expertise to all organizations within the OIG as well as developing and maintaining the OIG Management Information System;

2. Establishing basic organizational and operating policy with respect to all organizations involved, the types of reviews to be performed and the methodology of performance;

3. Establishing a formalized training program to ensure that OIG personnel are adequately prepared for ADP-related reviews; and

4. Considering further ADP audit staff development and training throughout the OIG based on identified workload.

APPENDIX VI

General
Services
Administration Washington. DC 20405

JUL 27 1981

Mr. Donald J. Horan
Director, Procurement, Logistics and
Readiness Division
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Horan:

Thank you for the opportunity to comment on your draft report: "Continuing Need by Federal Agencies to Develop Greater Computer Audit Capabilities." We agree with your conclusions and recommendations to ensure appropriate computer audit coverage within each Federal agency.

We are pleased that the General Services Administration's Office of Audits is characterized in the GAO report as an example of an effective computer audit group which has performed audits that resulted in savings and program improvements. As noted in your report, the GSA has already recognized the need for increased emphasis in the areas of computer technology and computer auditing. The Office of Inspector General has taken aggressive action to meet these needs. At the time of your review, we had eight audit positions devoted exclusively to computer auditing and had plans to add four more. However, due to current budget and staffing restrictions, only two additional positions were added. As a result of these cutbacks, we are increasing our computer audit training of the existing staff to help provide the necessary audit skills.

We will be pleased to discuss these comments if you have any questions.

Sincerely,

Ray Kline
Deputy Administrator

APPENDIX VI

National Aeronautics and
Space Administration

Washington, D.C.
20546

APR 28 1981

Reply to Attn of: L

Mr. W. D. Campbell
Acting Director of Accounting and
Financial Management Division
U.S. General Accounting Office
Washington, DC 20548

Dear Mr. Campbell:

Thank you for the opportunity to review GAO's draft report entitled, "Continuing Need By Federal Agencies To Develop Greater Computer Audit Capabilities," Code 913590.

We generally agree with the contents and recommendations contained in the report. Our detailed comments are provided in the enclosure to this letter.

Sincerely,

Russell Ritchie
Deputy Associate Administrator
for External Relations

cc: GAO/Mr. W. H. Sheley, Jr.

APPENDIX VI

GAO DRAFT REPORT
CONTINUING NEED BY FEDERAL AGENCIES TO
DEVELOP GREATER COMPUTER AUDIT CAPABILITIES

The following comments are furnished in response to GAO draft report Code 913590.

I agree with the contents and recommendations contained in the draft report and am in the process of identifying our computer audit resource requirements. However, we will have to schedule audits of computer systems in relation to our total audit responsibilities. At the present time, five auditors, or approximately 10 percent of our auditors have sufficient training and experience to conduct routine ADP audits. Only two have the qualifications to conduct the more sophisticated ADP audits. Staffing limitations and our other audit responsibilities preclude our exclusive use of even these resouces in the ADP area.

With over five hundred computer systems comprising 1,862 central processing units and almost an unlimited number of applications, we cannot provide adequate coverage without dramatic changes in our operation. I have established the development of ADP expertise as the highest priority for this OIG. I have moved the best qualified of our existing staff to a separate unit to work exclusively on ADP aspects of audits and investigations. Recruitment (when feasible) will consider our ADP needs before vacancies or any new positions are filled. Further we will train as many as possible of our existing staff in the basics of computer science. When appropriate, we will contract for additional ADP support. Although I recognize the enormity of this undertaking, I feel these steps will have the most significant impact on our ability to achieve the long-term goal of reasonable ADP audit and investigative coverage.

Jane G. Brown
Inspector General

APPENDIX VI

Office of the
Administrator
of Veterans Affairs

Washington, D.C. 20420

Veterans
Administration

AUGUST 10 1981

Mr. W. D. Campbell
General Accounting Office
441 G Street, NW
Washington, DC 20548

Dear Mr. Campbell:

We have reviewed the General Accounting Office (GAO) July 2, 1981 draft report, "Continuing Need by Federal Agencies to Develop Greater Computer Audit Capabilities," which states that with the expanding computer usage and the billions spent annually on data processing, Federal inspectors general and internal audit organizations must properly consider Government computer operations in fulfilling internal audit responsibilities. GAO reported that many Federal internal audit organizations have not provided adequate audit coverage for their agencies' computer operations as prescribed by GAO's 1977 report and the GAO computer audit standards. The report also states that while most of the audit organizations reviewed had conducted at least some computer audits since the 1977 report, many had not completely identified their agencies' computer activities to aid in planning appropriate audit coverage.

GAO recommends that the heads of Federal agencies help ensure that their inspectors general and internal audit organizations properly consider agency computer operations in providing internal audit coverage by requiring them to:

—Identify the agency's computer audit universe, including existing computer systems and applications as well as those being planned for design and development.

I concur, and the Office of Audit (OA), in the Office of the Inspector General, has developed a method for identifying the computer audit universe. Information about computer hardware/systems and applications is obtained through cyclical audits, program audits, and through the Office of Data Management and Telecommunications (DM&T). The OA is also in the process of obtaining updates from the Office of DM&T on those computer systems and applications already in place or in planning stages. A representative from OA serves on the Agency's committee for planning and designing computer systems.

—Determine the extent to which computer activities need auditing and conduct needed audits based on requirements of the GAO computer audit standards relating to the (1) adequacy of general and application controls; and (2) efficient, effective, and economical use of computers.

The Veterans Administration (VA), has been unable to fully comply with the GAO computer audit standards and has had difficulty in achieving the requirements of OMB Circular A-71 on cyclic security audits of computer systems. The noncompliance resulted from not having either a sufficient technical staff or a complete audit universe. The emphasis that is now being placed on computer related audits will assist the OA in complying with the GAO computer audit standards in a relatively short period of time. I agree that this extremely important and primary function must be met.

--Determine the staff and skills needed to meet computer audit responsibilities, and consider alternatives for developing and sustaining these capabilities.

I concur in this recommendation but also recognize that implementation is not possible until the complete audit universe is identified and we have determined the extent to which computer activities are in need of audit. However, there is no question that we need to assure that a well qualified staff is available to perform audits of computer systems, applications, and design activities.

—Periodically review audit coverage of computer systems and adjust allocations of staff resources accordingly.

I concur with this recommendation and, to the extent that audit findings permit, resource allocations will be adjusted to assure adequate audit coverage of computer systems.

—Establish a basic level of computer knowledge which all audit staff must attain. Auditors may reach this basic level through their own educational programs or by training during their employment.

The professional level of the VA auditors' computer capabilities is one of our primary concerns. In the past, the OA has experienced considerable difficulty in employing well qualified computer audit specialists and has attempted to meet these needs by hiring professional computer specialists and/or providing internal and external computer audit training for accountants and program specialists.

The OA has implemented an educational program to assure that all auditors obtain a basic level of computer knowledge. At this time, all professional staff has received basic training in the uses of the Health, Education, and Welfare Computer Audit System. As part of this training, the auditors received basic instructions on the general computer system and its utilization in the performance of audits. It is our policy to encourage auditors to obtain and/or continue their educational programs during their employment. It is also our policy to assure that professional staff members receive an

APPENDIX VI

average of two weeks training each fiscal year. We encourage professional staff members to avail themselves of external training opportunities on their personal time by funding those programs directly related to their professional duties.

Sincerely,

ROBERT P. NIMMO
Administrator

APPENDIX VI

DEPARTMENT OF THE TREASURY
WASHINGTON, D.C. 20220

INSPECTOR GENERAL

IN REPLY
REFER TO:

August 4, 1981

Mr. W. D. Campbell, Acting Director
Accounting and Financial Management Division
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Campbell:

This responds to the request to the Secretary of the Treasury for comments on the GAO draft report entitled "Continuing Need by Federal Agencies To Develop Greater Computer Audit Capabilities." The report recommends actions Federal agencies need to take to define, develop, and maintain appropriate computer audit capabilities.

We generally support the recommendations made in the report. However, the table on page 28 showing the number of professional audit staff and the number of auditors who are considered computer audit specialists or generalists is misleading as it pertains to Treasury.

As stated in the scope section of the report on page 5, GAO reviewed the computer audit activities of 19 Federal inspector general and internal audit organizations. One of these was Treasury. The table on page 28, however, shows only the immediate Office of the Inspector General with an audit staff of 10 and the Treasury's Office of the Comptroller of the Currency with a staff of 6. As of June 30, 1980, the audit staff for the Department as a whole totaled 633, of which 33 were computer audit specialists or generalists.

Treasury has a decentralized audit system, and we can and frequently do call on the resources of the bureau staffs as required. We believe, therefore,

APPENDIX VI

that the table should be adjusted to show the figures for the entire Department.

We appreciate the opportunity to review and comment on this draft report.

Sincerely,

Paul Trause

Paul K. Trause

APPENDIX VI

Comptroller of the Currency
Administrator of National Banks

Washington, D.C. 20219

July 29, 1981

Mr. William J. Anderson
Director
General Government Division
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Anderson:

We have reviewed your June 29, 1981 draft of the proposed GAO report entitled "Continuing Need by Federal Agencies to develop Greater Computer Audit Capabilities."

In the report, GAO notes that the Federal Government's dependence on the computer continues to grow, increasing the need for properly designed and operating computer system controls and efficient, effective, and economical use of computer equipment, programs, personnel, and other resources. Specifically, GAO recommends actions every Federal agency should take to define, develop, and maintain appropriate computer audit capabilities.

The Office of the Comptroller of the Currency (OCC) concurs with GAO's conclusions and recommendations contained in the draft report. In the past year, our audit division has surveyed our data processing division and will be reviewing the adequacy of the OCC's data security before the end of 1981. There has been a renewed emphasis on effective computer auditing within our agency. During future development of OCC's audit programs and plans, we assure you that we will attempt to incorporate all of GAO's recommendations, at the same time balancing their use with anticipated resource constraints.

We appreciate the opportunity to comment on the draft report.

Very truly yours,

Charles E. Lord
Acting Comptroller of the Currency

APPENDIX VI

Department of Energy
Washington, D.C. 20585

July 28, 1981

Mr. W. D. Campbell
Accounting and Financial Management
Division
U. S. General Accounting Office
Washington, D. C. 20548

Dear Mr. Campbell:

We have reviewed with interest the General Accounting Office (GAO) draft report entitled, "Continuing Need by Federal Agencies to Develop Greater Computer Audit Capabilities," and substantially agree with the issues and recommendations in the report. Recognizing the need to develop greater computer audit capability, we have initiated action to improve our ADP audit management.

During the last two years we established an ADP Systems Audit Branch within the Office of the Inspector General (IG). The Branch is staffed with three computer specialists and we are recruiting for a fourth. One of the Branch's first tasks was to perform a preliminary risk assessment of the Department's ADP applications to identify areas, functions, or programs where audit coverage should be directed. The IG, working with the Office of ADP Management, the Office of Computer Services and Telecommunications Management and the Controller, identified the existing and planned computer systems and applications. The IG also received guidance from the Office of Management and Budget, GAO and other agencies to determine the extent to which computer activities need auditing.

After identifying the Department's computer universe and auditing needs, the IG developed an ADP audit plan that established a prioritized audit program for the next year. GAO computer audit standards were used by the IG staff to develop specific audit guides.

During the first year the IG staff conducted several significant audits of the following aspects of ADP operations:

--Security of selected Departmental computer sites
--Development costs of computer-based information systems
--Economical, efficient and effective use of ADP resources
--Aspects of selected computer systems design, development and implementation

APPENDIX VI

Our ADP audit program for Fiscal Year 1982, which we intend to supplement with outside contractor support to increase our ADP audit coverage, will include audits of:

--Acquisition of major ADP hardware systems
--Acquisition of ADP software packages
--Acquisition and utilization of mini-computers
--Security Controls over classified ADP systems
--Design and development of selected financial systems

We also plan to increase the level of computer knowledge of the audit staff through on-the-job training offered by the computer specialists and selected training courses provided by the departmental ADP staff or commercial sources.

We believe that the Department is making substantial progress in establishing a long-range ADP audit capability. GAO should realize, however, that although we have taken steps to hire computer specialists, develop an aggressive ADP audit plan and cross train other auditors in ADP matters, audit staffing ceilings and competing priorities realistically limit the possibilities of providing comprehensive audit coverage to our over 2,600 computer systems. We are continuing to make every effort to fully implement your recommendations and believe that issuance of your final report should help us in attaining this goal.

Sincerely,

William S. Heffelfinger
Assistant Secretary
Management and Administration

APPENDIX VI

UNITED STATES DEPARTMENT OF COMMERCE
The Inspector General
Washington, D.C. 20230

30 JUL 1981

Wilbur D. Campbell
Acting Director
Accounting & Financial Management Division
U.S. General Accounting Office
Washington, D.C.

Dear Mr. Campbell:

We have reviewed GAO's draft report "Continuing Need By Federal Agencies to Develop Greater Computer Audit Capabilities". The report covers a problem that has long concerned Federal internal audit staffs - the adequacy of ADP audit coverage. However, it does not fully develop the causes of the problem and its recommended solutions will not substantially increase the number and quality of ADP audits.

Most internal audit organizations are criticized for inadequate computer audit work, but specific deficiencies are not identified and discussed. The report would be much more valuable to agency and internal audit management if organizations doing good and poor jobs were identified. Management could take corrective action and strengthen internal audit staffs.

The report states that two causes of inadequate ADP audit coverage are lack of management support (pp. 7, 13, 14, and 22) and staffing restrictions (pp. 7, 14, and 22). Department of Commerce management fully supports the Office of Inspector General audit efforts and in the past, has requested ADP audits, including system development audits. My top staff and I place a high priority on ADP audits, and are working to improve our ADP audit capabilities and coverage.

Specific comments on the report recommendations follow:

-- Identify the agency's computer audit universe, including existing computer systems and applications as well as those being planned for design and development.

   As part of our normal audit planning process we maintain an inventory of the computer audit universe. To the extent possible it includes major new system development projects. It is not practical to include all applications that are planned for development. Maintaining the inventory at the system, as opposed to application, level is adequate.

-- Determine the extent to which computer activities need auditing and conduct needed audits based on requirements of the GAO computer audit standards relating to the (1)

adequacy of general and application controls; and (2) efficient, effective, and economical use of computers.

-- Implementation of this recommendations is made difficult by the lack of specifics in the draft report as mentioned above. We will continue to perform audits in accordance with GAO standards on a priority basis within the resources available.

-- Determine the staff and skills needed to meet computer audit responsibilities, and consider alternatives for developing and sustaining these capabilities.

We consider the skills needed to do ADP audits when preparing audit plans for the year. Generally, we rely on outside hiring if needed skills are not available in-house. In the future we plan to hire consultants to complement and supplement in-house staff.

-- Periodically review audit coverage of computer systems and adjust allocations of staff resources accordingly.

When preparing annual audit plans we review the completed computer system audits, on-going audits and the universe of ADP audits that should be done. Staff is assigned as required.

-- Establish a basic level of computer knowledge which all audit staff must attain. Auditors may reach this basic level through their own educational programs or by training during their employment.

It is very difficult to establish a basic level of computer knowledge which all audit staff must attain, particularly since the report does not provide any information on what this basic level should be. If GAO has established a base level of computer knowledge which its auditors must attain we would consider reviewing and adopting such a standard.

-- In addition, we recommend that the Office of Management and Budget monitor agencies' progress in developing and maintaining their computer audit capabilities, and provide guidance as appropriate, addressing internal audit evaluation of computer-related controls.

We do not believe additional guidance from OMB is needed. OMB Circular No. A-71, transmittal memorandum No. 1 already requires the periodic audit or review of all sesitive computer application systems. The GAO audit standards clearly establish the auditor's responsibilities for ADP audits. As the report points out, OMB has prescribed these standards as the basic criteria for audit coverage and operations. It is

APPENDIX VI

difficult to understand what additional guidance is needed.

Thank you for giving us the opportunity to comment on this draft report. If you or your staff need additional information or wish to discuss our comments, please call me.

Sincerely yours,

Sherman M. Funk
Inspector General-designate

GAO Note: The page references have been changed in this letter where necessary to correspond to the final report.

APPENDIX VI

Federal Home Loan Bank Board

RICHARD T. PRATT
CHAIRMAN

1700 G Street, N.W.
Washington, D.C. 20552
Federal Home Loan Bank System
Federal Home Loan Mortgage Corporation
Federal Savings and Loan Insurance Corporation

JUL 27 1981

Mr. William J. Anderson
Director, General Government Division
General Accounting Office
441 G Street, N.W.
Washington, D.C. 20548

Dear Mr. Anderson:

This is in response to your letter of June 26, 1981, requesting our comments on your draft report entitled, "Continuing Need by Federal Agencies to Develop Greater Computer Audit Capabilities."

We concur with the spirit and intent of GAO's report emphasizing the need for adequate audit coverage of federal agencies' computer operations and believe that we are in compliance with the recommendations. Therefore, I am pleased to offer the following comments.

The Bank Board is committed to the development of an effective internal audit function and over the past few years has worked diligently toward meeting this goal. In January 1978, the internal audit responsibility of the Bank Board was removed as a line management function and was established as an independent Internal Review Office reporting directly to the Chairman and Members of the Bank Board. Subsequently, in keeping with the intent of the Inspectors General Act of 1978, the Office's responsibilities were expanded to include an investigative function and the Office was renamed the Internal Evaluation and Compliance Office (IE&CO) to reflect this reorganization. At the same time, one full-time supervisory auditor position in IE&CO was dedicated to coordinating and managing the agency's computer audit responsibilities. We believe that such a commitment of resources solely to computer auditing is significant considering the small size of both the agency and IE&CO. The individual currently filling this position has four years of computer audit experience in the federal government and receives periodic training from professional audit organizations to maintain proficiency.

In addition, a survey to identify the Bank Board's computer audit universe has been substantially completed. The survey results will serve to (a) determine the extent to which the

agency's computer activities need auditing and (b) identify the staff resources necessary to meet the agency's computer audit responsibilities.

Finally, we are attempting to expose each of our auditors to a basic level of computer audit principles and skills. This training is provided through the actual performance of computer audits under the close supervision of the IE&CO computer auditor as well as through external educational programs sponsored by organizations such as the Institute of Internal Auditors and the Interagency Auditors Training Program. More experienced levels of training will also be provided to the auditors as needed to meet any expanded computer audit responsibilities of the agency.

In closing, I believe these actions demonstrate the importance that the Bank Board places on an effective audit and investigative function including a strong computer audit capability. We appreciate the opportunity to comment on GAO's report and welcome any additional recommendations for improvement.

Please let me know if I may be of any further service in the matter.

Sincerely,

Richard T. Pratt

Richard T. Pratt

APPENDIX VI

THE POSTMASTER GENERAL
Washington, DC 20260

July 27, 1981

Dear Mr. Anderson:

Thank you for the opportunity to comment on your draft report, "Continuing Need By Federal Agencies To Develop Greater Computer Audit Capabilities."

We agree with the report's recommendations to the heads of Federal agencies and have already taken steps along the lines the report recommends.

Our major computer audit universe has been identified and our auditors keep up with the development of new systems through our Business Systems Plan.

The extent to which computer activities need auditing has been determined and we have identified the skill levels needed to assure an adequately trained staff for computer audits.

All the report's recommendations have either been implemented or are in the final stages of implementation.

Sincerely,

William F. Bolger

Mr. William J. Anderson
Director, General Government
Division
U.S. General Accounting Office
Washington, D. C. 20548

(913590)